

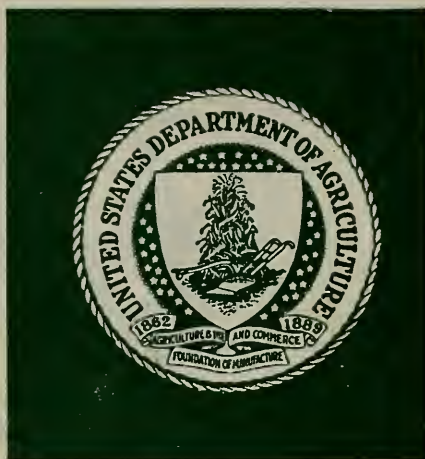
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REPORT OF THE

COMMISSIONER OF THE
LAND OFFICE

(1887)

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COOPERATIVE

PLANT PEST CONTROL

PROGRAMS

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UNITED STATES DEPARTMENT OF AGRICULTURE

COOPERATIVE PLANT PEST CONTROL PROGRAMS

Fiscal Year 1957

Plant Pest Control Division
Agricultural Research Service
United States Department of Agriculture
Washington 25, D. C.

March 1958

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CROPS REGULATORY AND CONTROL PROGRAMS

The regulatory and control programs in which the Department participates in cooperation with States, the Republic of Mexico, and Canada fall into three broad categories. These concern: (1) Incipient infestations of newly-introduced pests which through joint effort may be confined to very small areas or eradicated; (2) introduced pests that have become established over substantial areas in this country and where an effort is made to prevent or retard spread to additional areas; and (3) insects native to or generally distributed throughout their ecological or host range in this country which outbreak, periodically, causing widespread damage or destruction of crops in areas often remote from breeding grounds.

The Department's authority for participating in these programs is contained in the following general and specific Federal legislation: The Federal Plant Pest Act (Public Law 85-36), the Plant Quarantine Act of 1912 as amended (7 USC 151-167), the Pink Bollworm Act of 1930 (46 Stat. 67), the Incipient or Emergency Outbreak Resolution of 1938 (7 USC 148-148e), the Mexican Border Act of 1942 (7 USC 149), the Department of Agriculture Organic Act of 1944, as amended (7 USC 150-150g), the Insecticide, Fungicide, and Rodenticide Act of 1947 (7 USC 135-135k), the Golden Nematode Act of 1948 (7 USC 150-150-g), the Halogeton Glomeratus Control Act of 1952 (7 USC 1651-1656), and Public Law 518, the Miller Pesticide Residue amendment to the Food, Drug and Cosmetic Act of 1938 (68 Stat. 511).

Responsibility for preventing or retarding the spread of introduced pests into uninfested areas is usually shared by the infested States and the Federal Government. Historically, Coastal States, particularly those with extensive sea and airport facilities receiving foreign traffic and States bordering on other countries are most vulnerable to the introduction of new pests. The extended flight range of modern aircraft from foreign airfields, however, permits landings at points far inland thereby endangering establishment of pests in areas far removed from our sea coasts. When new species capable of causing severe damage to crops in this country penetrate the first line of defense which is port-of-entry inspection, the affected States and the Federal Government have jointly-supported programs to eradicate, suppress, or prevent further expansion of infested areas. In many instances such operations are of greatest benefit to the agriculture of non-infested States which cannot, except through their Federal Government, contribute to the programs that protect them. As an example, the golden nematode which currently infests only a few thousand acres on Long Island, New York, is a potentially serious pest of potatoes and tomatoes wherever they are grown in this country. Maine, Idaho, Pennsylvania, California, North Dakota, Colorado, and other States are beneficiaries of this program even though they participate only to the extent of surveys within their own boundaries.

On the other hand, the quarantined States and the growers therein have an inescapable interest in a program of this kind. Where only a part of a State is infested, as in the case of the golden nematode, Hall scale, soybean cyst nematode, witchweed, and others, there may be substantial uninfested areas within their own boundaries exposed to infestation. Furthermore, articles produced for interstate shipment within these infested areas provide revenue for the State of origin. When a regulated commodity is offered for inter- or intrastate shipment to a point outside of a regulated area, it is necessary that a certification be made as to its freedom from the pest if it is to be allowed to compete freely with commodities produced outside of the regulated area. To this end growers frequently provide material aid in carrying out the provisions of a quarantine. States assist in providing inspectors and otherwise contributing to the program.

As a part of the Department's regulatory and control program, cooperative surveys develop information that is needed to advise growers and others as to the prevalence of insect pests likely to cause widespread damage to crops. Agricultural agencies responsible for disseminating information on crop pests such as the Extension Service, Experiment Stations, State Departments of Agriculture, and other State and industrial organizations that engage in educational activities, rely on this source of information.

The effective control of many major crop pests requires timely treatment on an area-wide rather than an individual property basis. The survey provides a basis for forecasting outbreaks, thus contributing substantially to more effective and less expensive controls. Through the prompt release of information obtained, farmers are warned of impending epidemics and industry has advance knowledge as to where and when large quantities of insecticides will be needed.

The administration of the Federal Insecticide, Fungicide, and Rodenticide Act is an important phase of the Department's regulatory and control responsibility. This legislation provides assurance to farmers and other users of pesticides that the products they purchase can be depended upon to control pests without being injurious to people, useful plants, and animals. The Act protects the public from the sale of worthless or dangerous materials by authorizing the Department to give careful scrutiny, before marketing, to formulas and labeling of pesticides. Samples of pesticides collected from dealers' stocks and importations are checked to determine whether or not they are in compliance with the law. If they are in violation, appropriate corrective action is taken by the Department. Operations under the Act have greatly contributed to wider public confidence in the use of pesticides resulting in substantial savings to crops and livestock.

A brief review of each of the programs of a regulatory or control nature in which the Plant Pest Control Division actively participated during the fiscal year 1957 is presented on the following pages.

PLANT PEST CONTROL DIVISION REGIONAL OFFICES



BARBERRY ERADICATION

History: Stem rust has been recognized as a serious disease of cereal crops in this country since the very beginning of American agriculture. Even before the time of the Revolutionary War farmers observed stem rust in their grain crops and suspected barberry bushes as the source of the disease. Colonial laws had condemned the barberry before the relationship between rust on the barberry and that on grain had been proved.

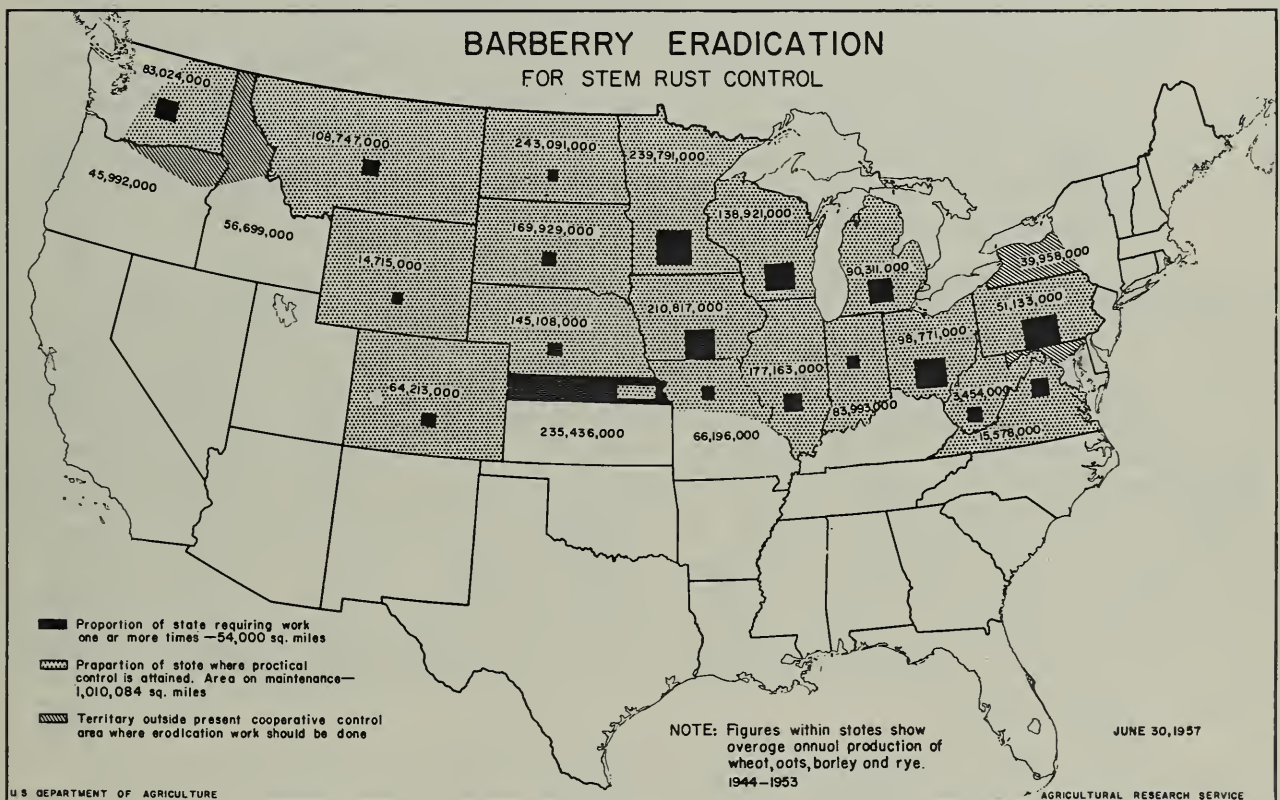
Nature of Disease: Stem rust is caused by a fungus that lives alternately on certain species of barberry and mahonia and on grains and grasses. It is spread between host plants by windborne spores. The rust survives winter temperatures in the black stage on grass hosts and on grain straw. In the spring infection develops on the leaves of the barberry and the disease is spread to grains and grasses. Once rust becomes established in grain fields it spreads from plant to plant and from one field to another until harvest time. As the crops mature the black stage again forms on the ripening straw, thus completing the life cycle.

Survey, Quarantine and Control: The organized cooperative barberry eradication project was started in 1918. The objective of the program is to protect small grain from damage caused by stem rust. Rust, coming early as it does from the barberry, often develops into epidemic proportions and causes damage over a wide area before harvest. Races of the rust fungus crossbreed on the barberry and produce new hybrid races that can attack grains previously considered resistant. The eradication program, therefore, serves two purposes: it eliminates the early local sources of stem rust and it destroys the host on which new races of the fungus are produced. The nineteen States participating with the Federal Government in the program produce approximately 2-1/4 billion bushels of wheat, oats, barley and rye on 93 million acres each year. These crops represent more than 3 billion dollars of annual income. Stem rust reduces both field production and quality of these crops.

Barberry bushes are killed with ammate applied to the cutoff canes or with sprays of 2,4-D and 2,4,5-T or combinations of the two. The enforcement of Federal and State quarantines prevents the reestablishment of susceptible barberries in areas that have been cleared. Barberry eradication when carried to practical completion will have eliminated, permanently, the source of early stem rust epidemics and the important source of new races. Losses from stem rust may still occur as a result of airborne spores that are blown in from Mexico and southern Texas where barberry is not a factor in the life cycle of the fungus. However, as millions of barberry plants have been eradicated in the 19 control States, the epidemic years have become less frequent.

Of the 1,064,533 square miles in the 19 States originally requiring work, 1,004,082 have been placed on maintenance and are now considered barberry-free. Within this area nearly one-half billion rust-spreading barberry plants have been destroyed on 150,658 properties.

Accomplishments, Fiscal Year 1957: Surveys for the purpose of determining stem rust prevalence and severity were conducted throughout the principal small grain areas of the States participating in the barberry eradication program. During the fiscal year 1957 systematic inspections covered 5,087 square miles and 835 new and 3,565 previously infested properties were cleared of 9,783,490 rust-spreading barberries. More than 1,700 properties were inactivated. Since the beginning of the program, 1,004,002 square miles were placed on maintenance. There now remain only 60,441 square miles that will require work one or more times. Of the 150,658 properties cleared of barberry, 58,116 remain active and will be reinspected on subsequent rework. Activity associated with stem rust operations resulted in slide and film presentations being given at farmer and civic group meetings, crop shows, and classrooms. A total of 37 exhibits were placed at fairs, farmer gatherings and service meetings.



BURROWING NEMATODE

History: The burrowing nematode (*Radopholus similis* (Cobb) Thorne) was discovered on banana roots in the Fiji Islands in 1890 and has since been reported in Jamaica, the Hawaiian and Philippine Islands, Formosa, South India, Dutch East Indies, Java, Brazil, Central America, and Puerto Rico. It is believed to have existed in Florida for at least 30 years. This is the only State with a known established burrowing nematode infestation in citrus. Results of surveys in Arizona in 1957 gave a good indication that the burrowing nematode is not established there in the areas sampled.

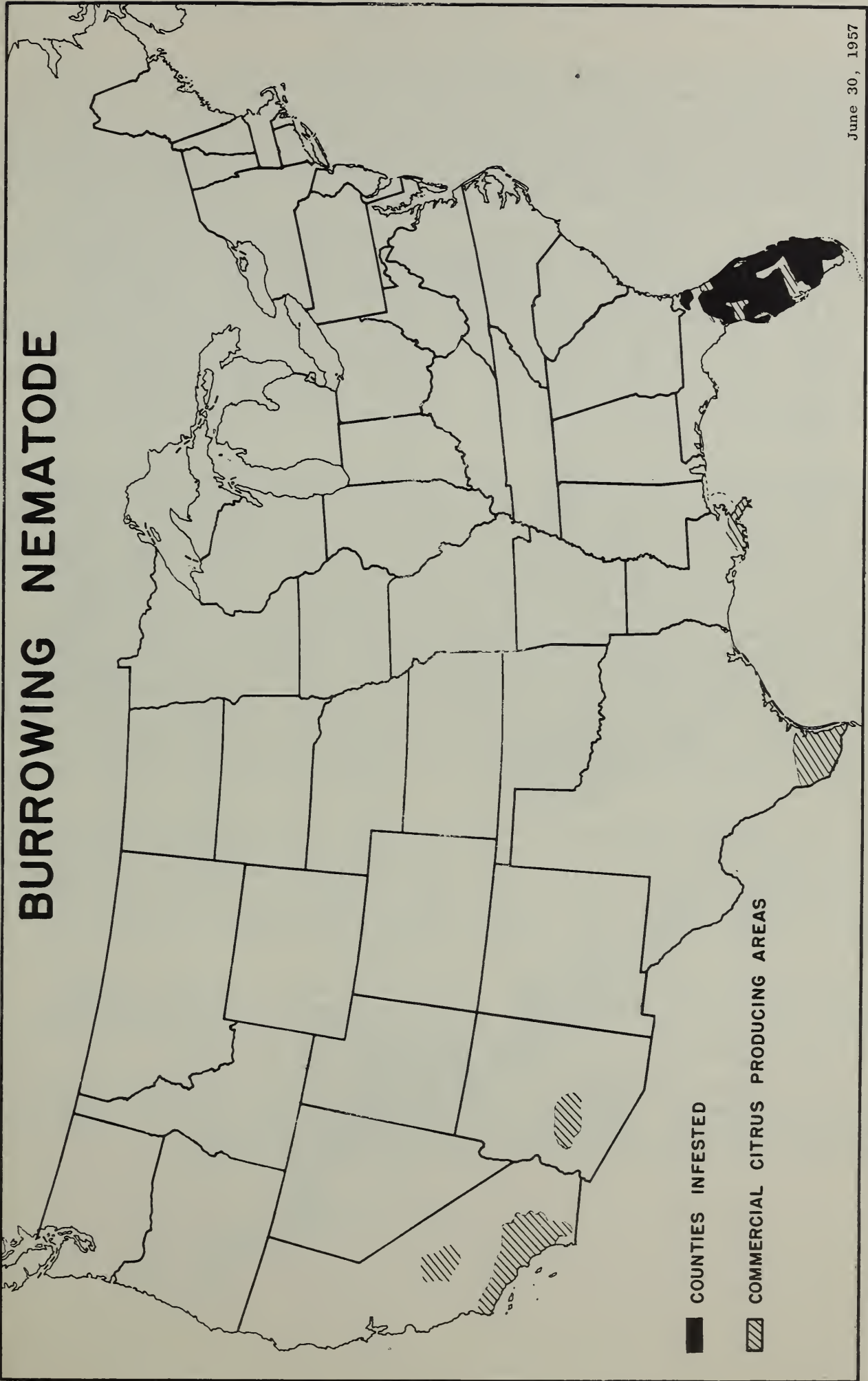
Nature of Pest: The burrowing nematode is a small parasitic eelworm approximately 1/40 of an inch long. It lives in roots of trees and other plants. The female deposits eggs inside the rootlets. The larvae feed on the roots and as the food supply is exhausted, they spread to other roots. The life cycle is completed in about 30 days. Infestation is spread concentrically about 50 feet each year.

The burrowing nematode stunts citrus and avocado trees. This condition is called "spreading decline." Its symptoms are sparse foliage, undersized leaves, and small fruit. Not only does the parasite attack the roots of citrus, but some 115 species of plants, including ornamentals and weeds, are suspected hosts. The host plants serve as nematode carriers. More than 8,000 acres of Florida are now known to be affected by "spreading decline." If not controlled, an estimated 44,000 acres could be affected by 1965. In general, it is said that this disease causes a reduction of 50 to 80 percent in yield of grapefruit, and 40 to 70 percent in the yield of oranges.

Survey, Quarantine and Control Program: Control measures administered by the State Plant Board of Florida include: (1) Surveys to delimit areas of infestation; (2) enforcement of State regulatory measures regarding infested nurseries, including supervision of the hot water treatment of citrus nursery stock; and (3) removal and destruction of infested trees and plants and treatment of soil with fumigant. The Plant Pest Control Division objectives are: (1) To assist the State Plant Board of Florida in detecting infestations; (2) supervise measures regulating movement of nursery stock to prevent spread of the pest and assist in carrying out measures to free nurseries of the nematode; and (3) establish whether the disease is present in other citrus-growing areas of the country. An emergency measure, which is being used pending further research developments, calls for the removal of all citrus trees affected, plus four additional trees in all directions, and fumigation of the soil with D-D at 600 pounds per acre. To combat spreading decline in other citrus-producing States, the Division is currently making surveys in California and Arizona.

Accomplishments, Fiscal Year 1957: Surveys were made in 30 Florida and 3 Arizona counties. In Florida: inspections were made in 1,080 citrus groves and 2,398 nurseries and greenhouses for a total of 29,642 acres; infestation was found on 325 properties with a total of 1,022 infested acres; delimiting inspections were made on 154 properties resulting in delimitation of 1,060 acres. The infestations included 173 citrus groves with 903 acres, 109 citrus nurseries with 67 acres, 23 ornamental nurseries with 35 acres, and 20 miscellaneous properties with 17 acres. In Arizona: inspections were made in citrus-growing areas comprising portions of Maricopa, Pima and Yuma Counties, involving 291 properties and 6,485 acres, and 6,423 samples collected for identification purposes. Control in Florida by the "push and treat" procedure, a function of the Florida State Plant Board, was applied to 26 nurseries and greenhouses and 139 groves with a total of 1,287 acres.

BURROWING NEMATODE



June 30, 1957

CITRUS BLACKFLY

History: The citrus blackfly (*Aleurocanthus woglumi* Ashby) is of Asiatic origin, invading the new world about 1913. It was first found in the United States in Florida in 1934, but the infestation was eradicated. In 1935 it was found on the west coast of Mexico and from this point it has spread rapidly along both the east and west coasts toward the citrus-producing areas of Texas, Arizona and California. It was next found in the United States at Brownsville, Texas on May 31, 1955.

Nature of Pest: It is not a true fly but is related to scale insects and aphids. The adult is a dark, bluish-colored, four-winged insect about 1/16 inch long. The pest spends most of its life in a stationary, scale-like form with its beak imbedded continuously in the leaf tissue, almost completely stifling the vitality and productivity of the tree. This insect can reduce a citrus tree to unproductivity more quickly than any other citrus pest known today. A two-year uncontrolled infestation has been known to cause total crop failure. The citrus blackfly has caused very severe damage to citrus plantings in Mexico, and it could be equally as destructive and very expensive to control if allowed to become firmly established in the citrus-producing areas of the United States.

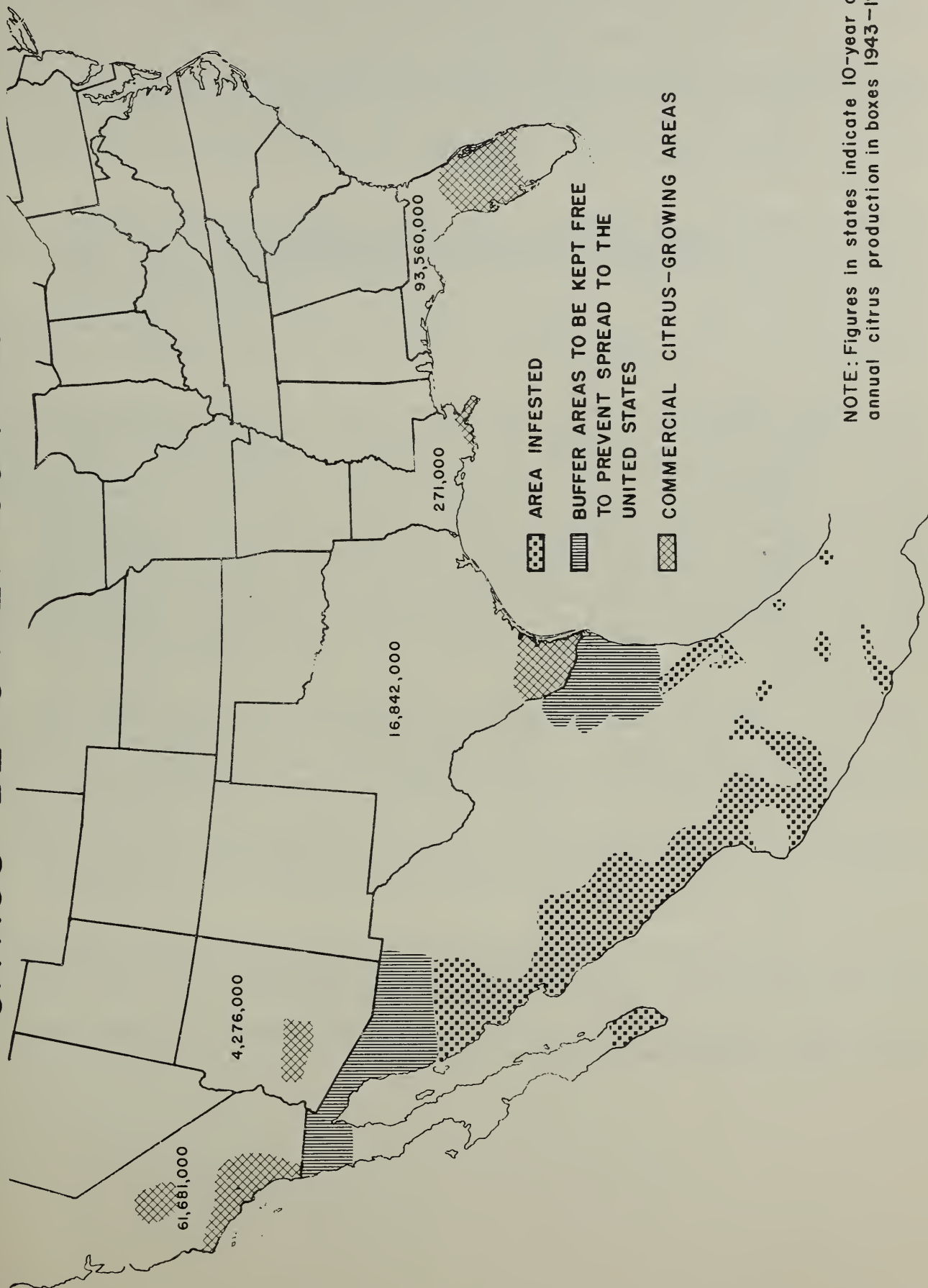
Survey, Quarantine and Control: Citrus blackfly surveys have been conducted in northern Mexico since 1949 by the Plant Pest Control Division in cooperation with the Mexican Department of Agriculture. The objective is to locate and eradicate infestations before eradication becomes impossible. The Mexican Department of Agriculture applies the control measures and enforces quarantines in the States adjoining the International Border. Excellent eradication results have been achieved, and many infestations have been eradicated in northern Mexico. In Mexico, reinfestations occur through reintroduction from contraband material brought in from the South. These are eradicated by spraying the infested trees. Eradication sprays applied by the Texas Department of Agriculture consist of three or more applications of spray at 21-day intervals. The spray formula is 1-2/3 gallons of light emulsive oil, 1/2 pound chemical containing 5 percent rotenone, and 100 gallons of water. Since discovery of the infestation in Texas on May 31, 1955, 33 infestations have been located; the last finding being in August 1956. Malathion is now being used instead of the standard spray of oil and rotenone in many cases.

There is no Federal quarantine against the pest. Although it is possible to eradicate an infestation, others will probably become established because the insect can be spread easily from one location to another by flight, and by movement of infested nursery stock and by vehicles. Recent expansion of transportation facilities in northwest Mexico have greatly increased the hazard of spread due to the increased travel and movement of products, a mutual concern to Mexico and the United States.

Accomplishments, Fiscal Year 1957: Inspections were in Cameron, Dimmit, Hidalgo, Webb and Willacy Counties within the State of Texas; involved 280,342 trees on 8,229 properties. Fourteen properties involving 29 trees were found infested, all in or near Weslaco in Hidalgo County.

All of the infestations appear to have been completely eradicated by the spraying treatments. The last infestation was found on August 31, 1956, and intensive survey inspections were made each month for the remainder of the fiscal year with no additional infestations being found.

CITRUS BLACKFLY CONTROL



NOTE: Figures in states indicate 10-year average annual citrus production in boxes 1943-1952

EUROPEAN CHAFER

History: The European chafer (*Amphimallon majalis*) was found for the first time in this country in western New York State in 1940. It is thought to have been brought here earlier with plants from France. It is now known to occur in nine counties in western New York and has been found in one county each in the States of Connecticut and West Virginia.

Nature of Pest: The yellowish-brown beetles emerge from the soil each day at dusk during June and July and "swarm" about trees and shrubs with a buzzing noise, but feed sparingly, if at all. The larvae, or white grubs, feed on roots of plants, often damaging pastures, turf, hay crops, alfalfa, small grains and other plants. Its destructiveness threatens agriculture in non-infested areas.

Survey, Quarantine and Control: From 1942 the New York Department of Agriculture and Markets has had the responsibility for carrying out regulatory procedures governing the movement of articles from infested areas within that State. Much of the related research has been done by the New York State Experiment Station. State agencies have done most of the survey work in that State. Federal regulatory and research units function largely in an advisory capacity in New York and arrange cooperative surveys elsewhere.

The program was strengthened in 1955 by a Federal quarantine which became effective in September of that year. The Federal regulations apply in parts of western New York and to part of one county in Connecticut and part of one county in West Virginia. Federal funds were used to assist in regulatory work, scouting and control in the infested areas, and special cooperative surveys in 19 States. Grub-adult mounts and literature about the chafer were distributed to all State plant pest control officials so that they could aid in the cooperative survey. Eradication soil treatments were applied on a Federal-State cooperative basis to all isolated infestations in New York, Connecticut, and West Virginia. Cooperating States have made substantial contributions in services and funds for regulatory, survey and control work. Regulated industry has spent large sums for quarantine compliance.

Research is underway to develop soil and plant treatments necessary for quarantine compliance and an effort is being made to develop a more effective trap with sex, sound, or light attractants. This latter development is needed for dissemination surveys outside the known infested areas, and to determine the degree and extent of spread in the areas under regulation.

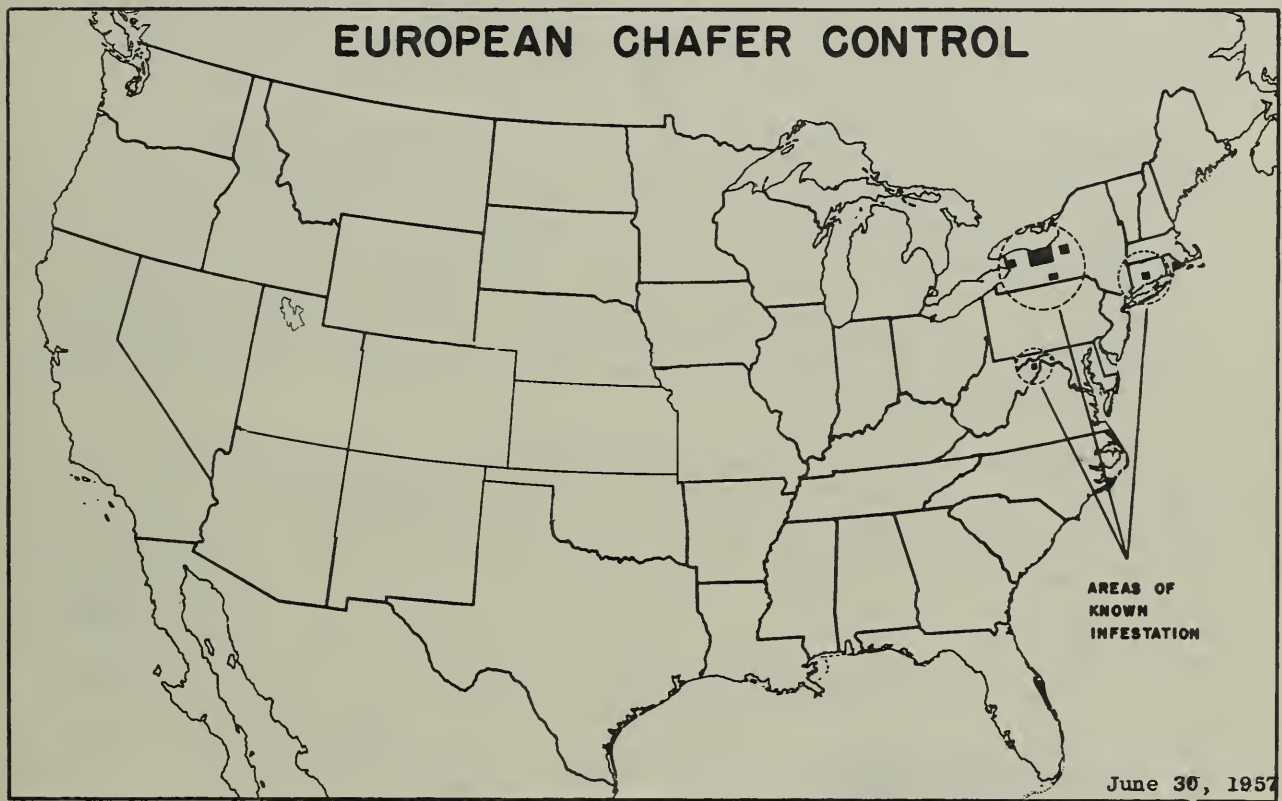
Accomplishments, Fiscal Year 1957: During the adult flight period special survey activity was conducted in the District of Columbia and the 13 States comprising the Eastern Plant Pest Control Region, utilizing 1,250 traps. In addition, surveys were conducted throughout the year in seven counties in northern North Carolina.

Infestations were found in nonregulated areas near Syracuse, New York, and Meriden, Connecticut. The additional new New York areas have since been placed under State and Federal quarantine regulations.

Cooperative tests are underway with State-Federal research agencies aimed at development of improved detection techniques.

Soil treatments were applied to a total of 28 acres in the vicinities of Buffalo and Elmira, New York, as extensions of previous eradication treatments. Since the European chafer was first observed there, regulated plant-growing establishments in western New York have treated more than 400 acres with residual insecticides in compliance with quarantine certifications. Additional acreage has been treated by shippers of sand and gravel.

Inspection activity within the quarantined Capon Bridge, West Virginia, area during the fiscal year failed to reveal any continuance of European chafer infestation. Suspicious specimens collected in 65 traps set in this area all proved to be negative.



GOLDEN NEMATODE

History: The golden nematode (*Heterodera rostochiensis* Woll) was first discovered in 1941 in Hicksville, Nassau County, Long Island, New York. Present infestation is confined to Nassau and Suffolk Counties of Long Island.

Nature of Pest: Eggs and larvae of the golden nematode pass the winter in a thick-walled, protective cyst. In the spring, in the presence of host plants, the eggs hatch and the larvae attack the roots. After penetrating the root the larvae undergo a series of changes, the males moving freely, the females becoming more or less stationary. The female body enlarges and breaks through the outer layer of the root. After fertilization it continues to enlarge and becomes a protective cyst encasing eggs and larvae of the next generation.

Potatoes, tomatoes and eggplants are the only hosts of economic importance. This nematode injures the root system and causes stunting and dying of plants and reduced crop yield. On Long Island nematologists have found up to 85 percent reduction of potato yield on heavily infested land.

Survey, Quarantine and Control Program: The objective of the program is to prevent spread of the organism and reduce cyst populations on presently infested lands. The New York State Department of Agriculture and Markets, aided by the Federal Division of Nematology, conducted annual surveys which by 1944 disclosed infestation of 1,238 acres of potato lands. Since 1947 the Plant Pest Control Division has conducted soil-sampling surveys in important potato-producing States in cooperation with the States concerned. These surveys have generally been conducted in each area once every three years. No established infestation of golden nematode has been found outside Long Island.

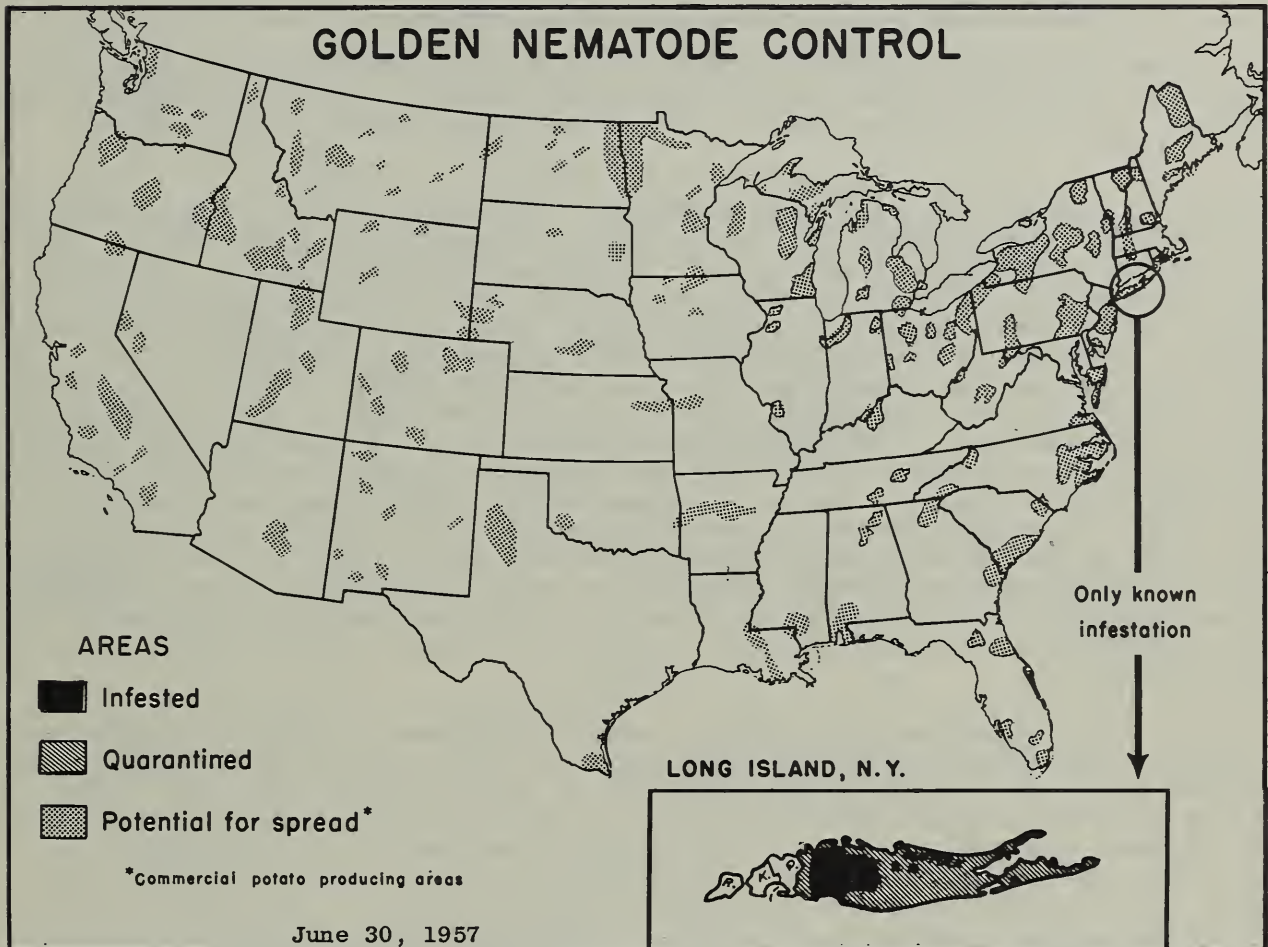
There is no Federal quarantine but a New York State quarantine was established in 1944. The regulated area includes all of Nassau and Suffolk Counties. The Division cooperates with New York and other States in making surveys. Surveys are conducted annually on Long Island and infested land is removed from host crop production. Regulatory measures govern movement to other parts of Long Island or elsewhere in the country of materials or equipment likely to be contaminated. Since golden nematode continues to be a threat to the potato and tomato industries, survey, quarantine, and control measures in New York State will be continued in cooperation with the State Department of Agriculture and Markets. Nationwide surveys are scheduled to be made at regular intervals. A field test fumigation program is being tried to determine if golden nematode infested land can be returned to potato production.

Accomplishments, Fiscal Year 1957: Discovery of very few new infestations despite diligent and extensive inspections and the low population status of existing infestations indicate that a high degree of control is being attained.

Field by field surveys were made of 29,773 acres of Long Island, New York, potato land. Golden nematode infestations were newly discovered on eight properties within the general area of Long Island infestation. These eight properties totaled a gross of about 272 acres, none of which contained a high level of golden nematode infestation. In addition examinations were made of potato grader soil collected from over 8,100 acres in New Jersey, with no evidence of infestation being found.

Forty-seven acres of infested land were treated with two applications of D-D fumigant using dosages of 450 pounds per acre per application.

Housing and industrial developments are having important sideline effects on the control of golden nematode on Long Island. To date 7,732 acres of infested land, much of which was infested at comparatively high golden nematode population levels, have been removed from agricultural consideration by housing and industrial developments.



GRASSHOPPERS AND MORMON CRICKETS

History: Grasshoppers and Mormon crickets are native to the United States. Grasshoppers are generally distributed throughout all States but are recurrently most severe in the midwestern and western States. Mormon crickets occur in the western part of the United States.

Nature of Pest: The Mormon cricket and most species of grasshoppers hatch during the spring months from eggs deposited in the ground the previous season. The nymphs develop into adults during the summer. The adults deposit their eggs in the summer and fall, and then die. These pests generally feed on cultivated crops and/or range grasses. Each of these insects, in outbreak proportions, is capable of full destruction of the plants. In many cases even light populations can cause severe damage.

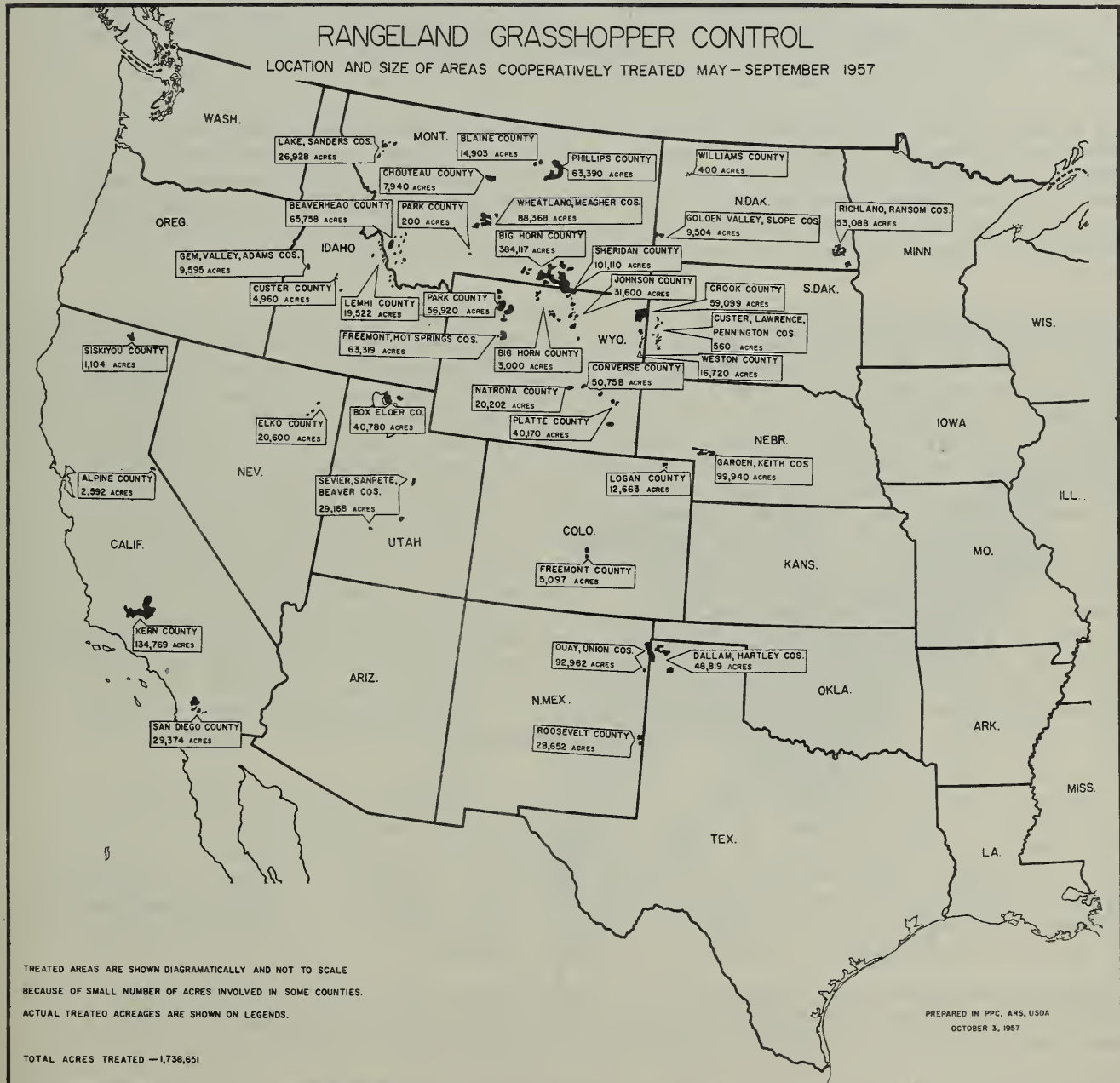
The Bozeman Laboratory of the Division of Cereal and Forage Insect Investigations has estimated that the average annual loss to crops and range forage combined, in the 17 States west of the Mississippi River, approximates \$90,000,000.

Survey and Control Program: The immediate objective of the control program is to destroy infestations of grasshoppers and Mormon crickets before they can seriously damage current season's planted and range crops. The long-range objective is to prepare farmers and ranchers to take local action to control these pests before they build up to outbreak proportions. Division personnel provide technical leadership and direction in evaluating the problem, planning and executing control and determining results. The work falls into four main categories: (1) Continuing surveys to locate and evaluate infestations; (2) participation in control of infestations on low-value public and private rangelands, particularly when migratory species are involved and there is danger of spread over wide areas and when local facilities are inadequate to handle the problem; (3) control on Federally-owned land in cooperation with Federal land-managing agencies; and (4) provision of technical assistance and program services to farmers who finance crop-area control. Program activities are conducted cooperatively with the States, Federal agencies, rancher and farmer groups, and agricultural organizations.

The first well-organized grasshopper control program involving Federal participation was initiated in cropland areas in the midwestern States in 1934. Poisoned bait was used to kill grasshoppers and was spread by hand or by various homemade mechanical spreaders. In later years more effective control was achieved through the use of new insecticides and more efficient bait mixing and spreading facilities. Bait is still used today to control the Mormon cricket and, in a few instances, farmers prefer it for small grain protection against grasshopper attack. Grasshopper infestations, in general, are now effectively and economically controlled by insecticides applied as a spray by ground equipment or by airplanes.

Accomplishments, Fiscal Year 1957: Grasshopper control activity was conducted on a total of 2,403,939 acres of rangeland in 15 States. This work was cooperative with States, counties, landowners, other Federal agencies and the Plant Pest Control Division each participating financially in the respective programs. Insecticides in the form of sprays were applied to the range areas by contract aircraft and Federally-owned equipment. In the areas of cropland infestations, the Plant Pest Control Division furnished technical assistance to the farmers through their local organizational units.

Mormon cricket cooperative control programs were conducted during fiscal year 1957 on 75,883 acres as follows: Oregon, 2,085 acres; Nevada, 22,789 acres; Utah, 19,634 acres; and Wyoming, 31,375 acres. Control was accomplished by spreading five to ten pounds per acre of aldrin-impregnated rolled wheat via contracted planes. Kills were excellent. In those instances where Mormon crickets threatened cropland or where rangeland infestations existed but cooperative control programs did not materialize, the Division supplied technical assistance and demonstration equipment to landowners.



GYPSY MOTH

History: The gypsy moth (Porthetria dispar) a native of southern Europe, Asia, and north Africa, was introduced into Massachusetts from Europe about 1869. The generally infested area now includes New England and eastern New York, with spot infestations in Michigan, Pennsylvania, and New Jersey. The presently known infested area represents less than 3 percent of the total area of the United States.

Nature of Pest: The adult female moth deposits about 400 eggs in a single cluster in July or early August. The insect overwinters in the egg stage. Hatching occurs in early May and the caterpillars, which are voracious feeders, inflict severe damage and mortality by defoliating trees and shrubs. After attaining full growth by mid-June the caterpillars change into pupae and about two weeks later adult moths emerge. The male moth is a strong flyer but the female is incapable of flight and dies soon after deposition of eggs. The adult moths take no food.

The gypsy moth is a serious pest of deciduous trees and shrubs and evergreens are attacked under outbreak conditions. When outbreak conditions develop, feeding results in defoliation of extensive forest areas involving thousands of contiguous areas. The greatest potential for economic loss occurs in uninfested areas west and south of the presently infested region where more than 100 million acres of susceptible hardwood forests are present.

Quarantine and Control Program: The objective of the program is to prevent further spread of the pest and to prevent damaging outbreaks within the infested area by the enforcement of Federal and State quarantines, surveys to detect new infestations, the application of sprays to eradicate outlying and peripheral infestations, and by technical assistance to States. Interstate movement of forest and quarry products and other commodities is regulated under a Federal quarantine and intrastate movement under parallel State quarantines. Westward spread of the insect was slow and notable progress was made in halting further spread between 1923 and 1948 when intensification of control work confined the western periphery of the generally infested area to the western edge of New England. Following the hurricane of 1938, infestation was found scattered throughout eastern New York and evidence is strong that broken fragments of egg masses were carried there by the winds. This extensive spread was followed by the worst gypsy moth outbreak on record from 1952 to 1954 and further spread occurred as a result of wind dispersal of small larvae in a westerly direction. In 1954 a similar infestation was found at Lansing, Michigan. Each year since then surveys have been made in the area and control measures taken when necessary.

Sex-attractant traps are used extensively in current survey operations in determining distribution of the pest and for checking efficacy of control operations. Outlying and peripheral infestations are sprayed by aircraft using DDT at the eradication dosage of one pound in one gallon of spray per acre. Outbreak conditions within the generally infested region are brought under control with even lighter dosages of DDT. There is immediate need for intensification of regulatory and control activities along the periphery of the general infestation to prevent further spread.

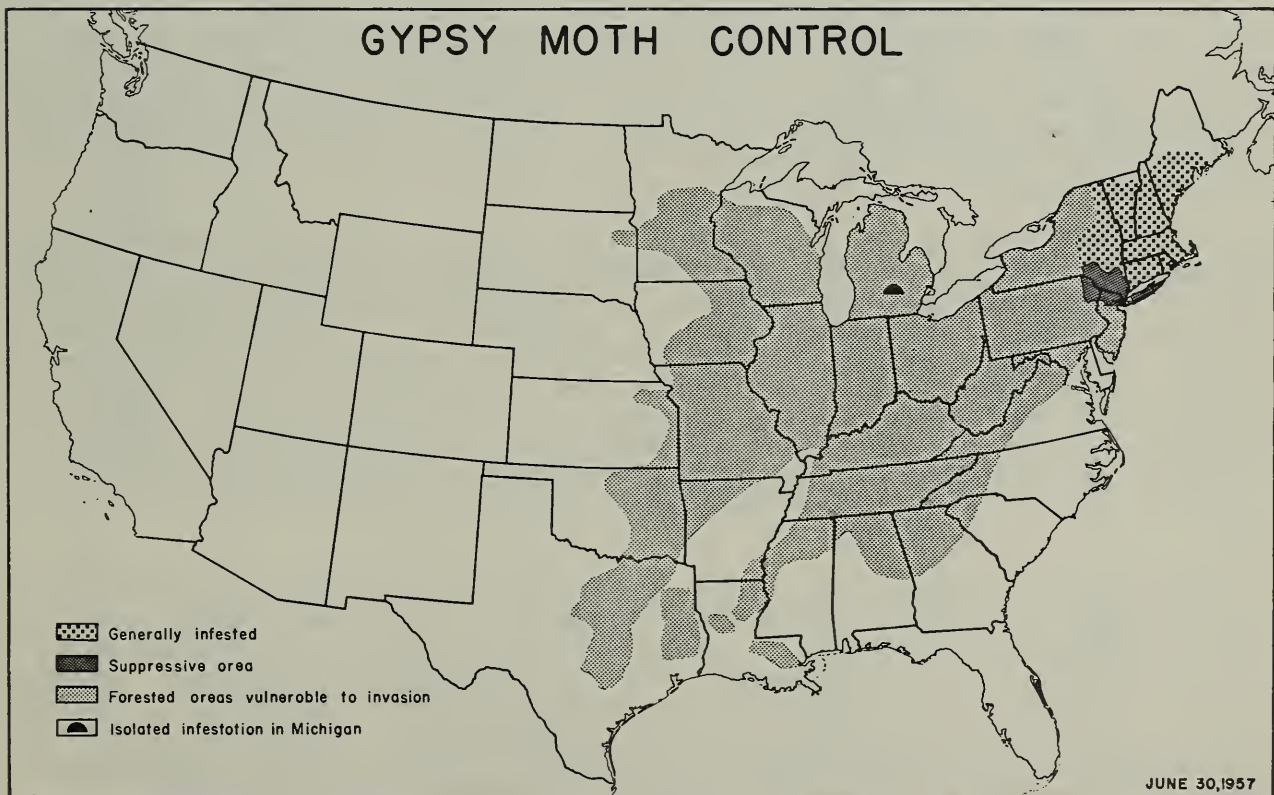
Program operations are conducted in cooperation with pest control agencies in States involved. Survey and control activities are conducted in all areas under authority of applicable plant pest laws of the States involved.

Accomplishments, Fiscal Year 1957: Gypsy moth infestation in Michigan required spraying of approximately 18,880 acres in 1957. The placement of 4,922 traps in the control area following this activity failed to reveal any male moths, indicating that the Michigan control effort was so effective that spraying in the area will not be necessary the following year.

The large-scale cooperative spray program aimed at eradication of the gypsy moth in the peripheral tri-state area of New York, New Jersey and Pennsylvania was started in April and completed on June 14. All known or indicated infestations within this southwestern peripheral area were treated. A total of 3,005,929 acres was sprayed. In addition, suppression treatments were applied cooperatively to approximately 400,000 acres in New York and New England States, to reduce populations and prevent defoliation and damage in the generally infested area.

An extensive trapping program involving the use of 16,368 traps to survey approximately eight million acres along the periphery of the known infested area and in the 1956 spray area, and scouting surveys conducted in 1956 outside the regulated area to delimit infestation, disclosed a few scattered spots of very light infestation within this peripheral area. No infestations were indicated or found near the outer limits of the area surveyed.

The gypsy moth and brown-tail moth quarantine was revised and related administrative instructions designating regulated areas issued effective July 20, 1956. The latter placed under regulation, additional areas in New York and Vermont found infested in 1955 - 1956; and designated the entire area under regulation as the Generally Infested Area. The quarantine revision provided for shipment of regulated articles under a Certificate of Exemption for the first time.



HALL SCALE

History: Common throughout the Middle East, Hall scale (*Nilotaspis halli*) was first found in the Western Hemisphere in 1934 infesting stone fruits in the experimental plantings of the U. S. Plant Introduction Garden, Chico, California. However, it apparently had been introduced into California about 1911 or 1912 from Chinese and Russian Turkestan.

Nature of Insect: Little is known of this very prolific diaspid scale. It is so minute that 2,000 individual specimens have been found on a single almond hull. One and a partial second generation occur between the time the first crawlers emerge in late March and the middle of October when the scale is found on all parts of the host. The scale enters into the deep bark fissures of the tree damaging fruiting wood and current growth and mal-forming fruit. Up to 25 percent loss of fruit may result. If this pest were allowed to become established in California some 385,000 acres of deciduous fruit in California, valued at more than \$228,000,000, would be subject to infestation. Spread from California would endanger thousands of acres of stone fruit throughout the country.

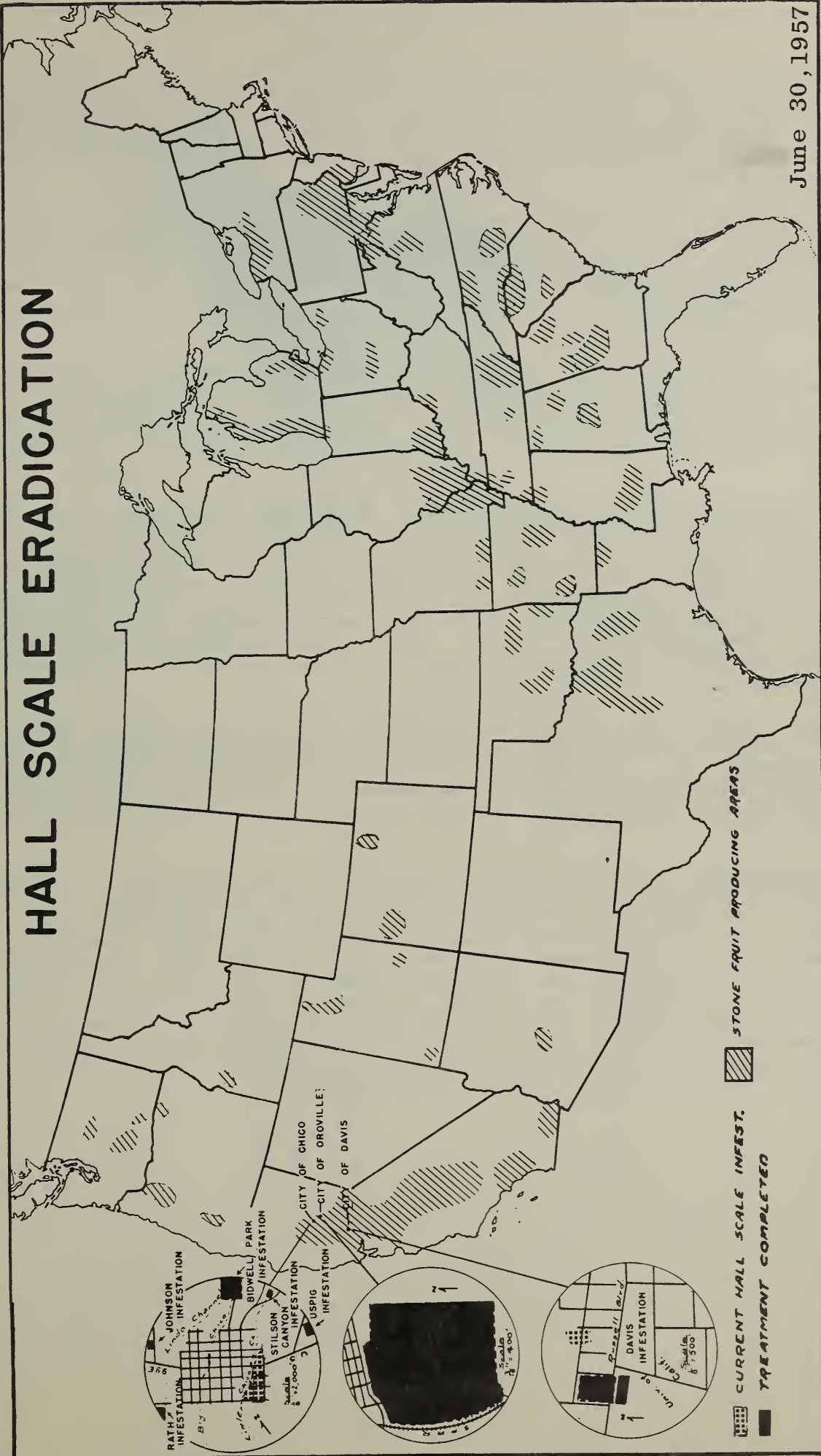
Survey, Quarantine and Control: The objective of the program--to locate and eradicate Hall scale from all existing infestations--is being realized by the enforcement of State regulations regarding the movement of plant material, by survey of host-growing areas, and fumigation or removal of infested trees. When Hall scale was discovered in the U. S. Plant Introduction Garden at Chico in 1934, the California Department of Agriculture started eradication procedures but the scale was again found in the Garden in 1940 and from there it spread to a nearby large commercial orchard. The State of California then joined forces with the United States Department of Agriculture to form a cooperative project of eradication. An extensive survey made in California and other western States and in Gulf Coast States which have a climate similar to that in which the scale is found revealed eight localized infestations centering in the vicinity of Chico, Oroville, and Davis, California.

Normal spray programs are not completely effective. However, the use of hydrocyanic acid gas in three consecutive fumigations has been found effective in obtaining complete mortality of the scale. Removal of hosts and fumigation have finally eradicated the original U. S. Plant Garden infestation. At present all infestations have been fumigated with the exception of two areas, one in Chico, Butte County, and one in Davis, Yolo County, which are now receiving treatment. Infested areas are undergoing delimitation surveys and properties which have been fumigated are being inspected periodically. The California Bureau of Entomology, and its agencies, and the USDA Plant Pest Control Division cooperate in this program.

Accomplishments, Fiscal Year 1957: Fumigation operations were confined to three remaining infestations whereon 2,657 host trees and shrubs were treated during the winter months. This eradication program has advanced to a near elimination of infestation from all areas under treatment. Inspections were made of 61,911 hosts on 5,095 properties, a majority of which were in the vicinity of previous local infestations. Barring unforeseen developments, final fumigation should be made by the winter of 1957 and inspections of infestation areas completed by the winter of 1959.

HALL SCALE ERADICATION

June 30, 1957



JAPANESE BEETLE

History: As the name indicates, the Japanese beetle (*Popillia japonica*) is of oriental origin. It was brought to New Jersey with plants from Japan prior to 1916 and is now found in parts of coastal and adjacent States from Maine to Georgia with some spotted infestations outside this area as far west as Mo. The infested region equals about six percent of the area of the United States.

Nature of Pest: The beetle lives in the soil as a white grub for about 10 to 11 months. The adult, which emerges in early summer, is about one-half inch long, of a brilliant metallic green or bronze color with coppery-brown wing covers and the abdomen is marked by a row of white spots. The female beetle lays eggs in the soil. The adults are most numerous in July and disappear by September.

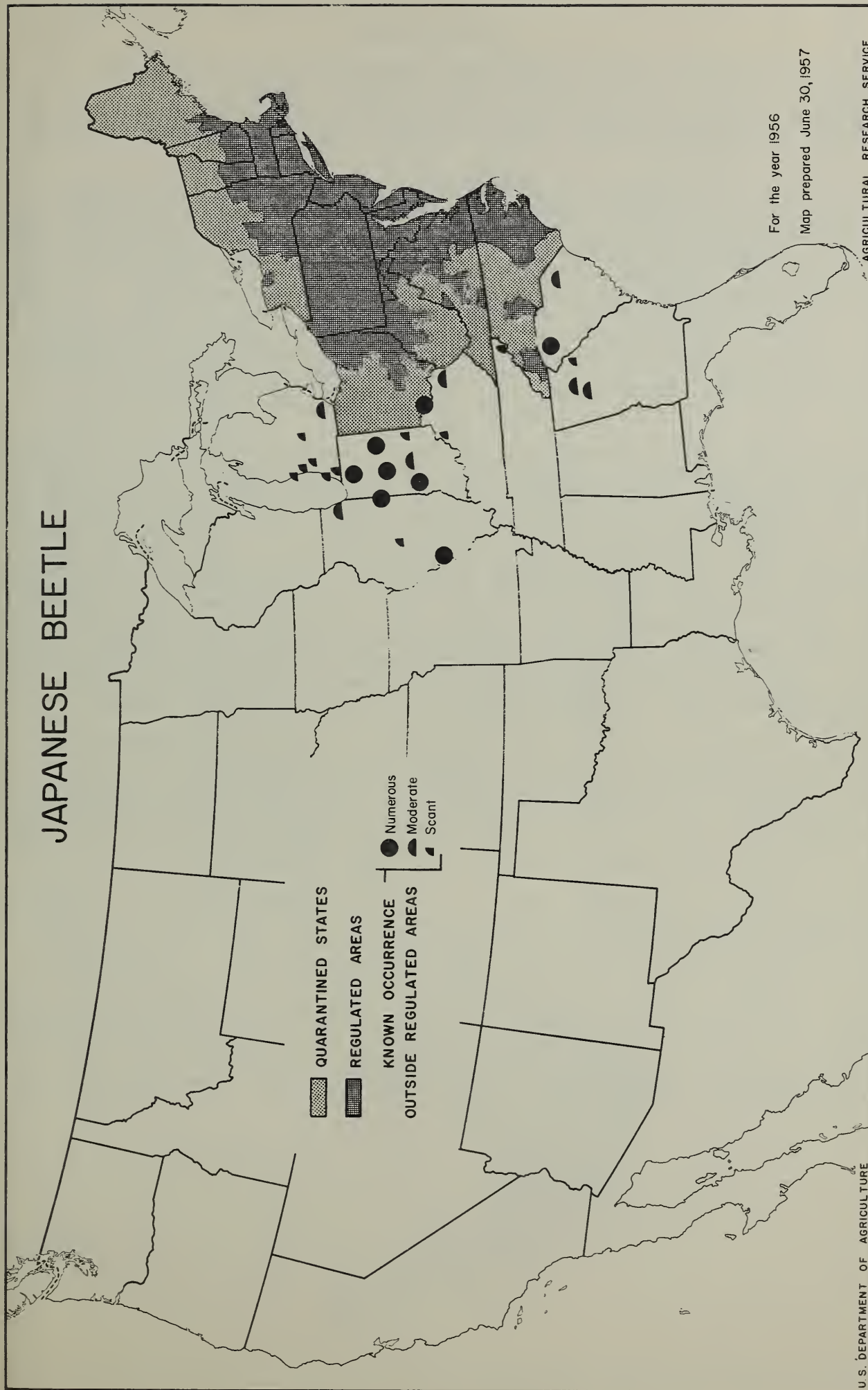
The beetle attacks more than 200 agricultural and ornamental plants, causing damage of around \$10 million annually. In summer the adult, which lives about 30 days, feeds on and skeletonizes the leaves of peaches, apples, small fruits, corn, soybeans, ornamentals and other plants. The root-feeding grub is responsible for extensive damage to turf in pastures, lawns and golf courses.

Survey, Quarantine and Control Program: When once established, control of the Japanese beetle by insecticides or biological controls is a slow, difficult and costly process. For this reason Federal-State regulatory controls have been put into effect to protect uninfested areas. In force since 1919, the quarantine and control program provides safe, effective, and economical compliance procedures with a minimum of interference to regulated industry, commerce, and the public. Quarantined and regulated areas now apply to the District of Columbia and the areas outlined on the accompanying map.

The operation of this program under Federal leadership, combined with Federal research, has provided a practical and successful method of controlling this pest. To increase effectiveness of quarantine and control, continued cooperative research is necessary in adapting the use of new insecticides for control and the improvement of methods of application, including the use of aircraft.

Accomplishments, Fiscal Year 1957: Survey activity resulted in extension of State quarantined regulated areas in Virginia and West Virginia. Surveys outside of the regulated area involved placement of 31,348 traps and scouting 1,786 locations, resulting in initial infestations being found at 107 locations and recurrence of infestations at 124 points. Treatments were applied as soil applications to 10,389 acres. A total of 85,333 gallons of insecticides were applied as foliage treatments. The objective of these cooperative State-Federal control programs, utilizing both ground and air equipment, were to reduce the spread hazard from isolated, or heavily, infested areas. Certification calls totaled 20,349. Estimated value of products certified totaled more than \$18,987,000.

JAPANESE BEETLE



For the year 1956

Map prepared June 30, 1957

KHAPRA BEETLE

History: The khapra beetle (Trogoderma granarium), which was first described in 1898, is a native of India, Ceylon, and Malaya, where it is considered the most serious of all storage pests. It is now known to occur in England, Australia, Korea, Germany, Egypt, and other European, African, and Asiatic countries.

The discovery of a khapra beetle infestation in a warehouse at Alpaugh, Tulare County, California, on November 10, 1953, represented the first known occurrence of this insect in the Western Hemisphere. There is evidence that the beetle may have been present in a warehouse at Fresno, California, as early as 1946. Used burlap bags taken from the Fresno warehouse to Alpaugh apparently account for the infestation that later was found there. It was found infesting stored grain in Phoenix, Arizona, January of 1954, and in April of that year specimens were recovered on sacked seed in New Mexico. Also, in 1954, khapra beetles were collected from a warehouse in Mexicali, Baja California, Mexico. Since the initial discovery of khapra beetle in the United States, infestations have been found on 155 properties in Arizona, 296 in California, 6 in New Mexico, and 48 in Baja California.

Nature of Pest: The life cycle of the khapra beetle is completed in from 35 to 100 days, depending on temperature. Temperatures from 85 to 90° F. are optimum, yet the larvae have been known to withstand temperatures of 14° F., for short periods of time, and the upper level is considered to be about 115° F. There are five molts in the development of the larvae, and the cast skin is shed following each molt. The female lays an average of 120 eggs. The adults live but a short time and apparently do not feed. Grain damage, depending upon existing conditions, varies from 5 to 30 percent, and damage up to 75 percent has been reported. In this country it has been found in oats, wheat, corn, beans, nuts, alfalfa seed, castor beans, cottonseed, and other food products. Preferred processed materials include cornmeal, rolled oats, flour, breakfast cereals, crackers, dog biscuits, powdered milk, raisins, and nut meats. Bulk grain under extended storage presents the most favorable conditions for beetle multiplication and subsequent damage.

Control: Because of the habit of the larvae of concealing themselves in crevices and cracks and living for extended periods without food, nothing short of a penetrating fumigant provides effective eradication. Methyl bromide applied to structures under gastight tarpaulins is recommended for the fumigation. It is applied at the rate of 5 pounds per 1,000 cubic feet; the exposure period is 48 hours, and concentrations of gas in the building are to remain at 32 ounces or above for at least 24 hours of the period.

Accomplishments, Fiscal Year 1957: In 1957 inspections for khapra beetle in warehouses, mills, elevators, urban and rural storage were made at 26,485 sites widely distributed across the Nation. Of this number 13,626 were classified as initial inspections. The activity resulted in submittal of 8,223 specimens for identification and the finding of infestation at 84 sites. Twelve of these infested sites and 1,890 of the inspections are from adjacent territory in the Republic of Mexico which is participating in this program. Of the 505 properties found infested in the United States and the Republic of Mexico, involving approximately 137,155,233 cubic feet, 475 premises having a volume of 130,320,277 cubic feet have been fumigated and released from quarantine.

KHAPRA BEETLE ERADICATION

The khapra beetle has been found damaging wheat, barley, rye, flax, peas, alfalfa, and sorghum in this country. It is known also to attack maize and rice. More than 6 billion bushels of these crops are produced annually in the United States. All of this grain or seed is placed in storage on or off the farm at some time before it is consumed. This insect, which builds up rapidly and resists ordinary control measures, has a high potential for spread to storage facilities throughout the United States.

Infestation found in
warehouses, mills, and
farm storages in 29
counties.

AREAS OF KNOWN INFESTATION

505 PROPERTIES INFESTED (U.S. & Mexico)
(140 million cu. ft. of storage volume)

475 PROPERTIES TREATED (U.S. & Mexico)
(130 million cu. ft. of storage volume)

Note: NUMBERS (Above line=sites infested, below
line=sites treated)

296
281

6
5

155
145

48
44

JUNE 30, 1957

MEDITERRANEAN FRUIT FLY

History: The Mediterranean fruit fly* is a native of the Mediterranean area. It has been reported in Europe, Asia, Africa, South America, Central America, and the State of Florida in the United States. The first infestation in the United States was found in Florida in 1929, and involved 20 counties in the central part of the State. It was eradicated by the latter part of 1930 at a cost of about \$7,500,000. It was not found again in the United States until April 13, 1956, when a citizen of Miami Shores, Florida, found larvae in grapefruits and gave them to the Assistant County Agent of Dade County, who forwarded them to the sub-tropical Experiment Station at Homestead for identification. They were forwarded in turn to the Entomology Department of the State Plant Board at Gainesville and the United States National Museum in Washington, D. C.

On April 17, the Plant Commissioner of the State Plant Board was informed of the tentative identification of the larvae as being the Mediterranean fruit fly. At his direction, McPhail traps were placed in the vicinity of Miami to collect additional specimens if possible. By April 19, eleven adult Mediterranean fruit flies were trapped and State and Federal officials were informed of the confirmation of the tentative determination as Mediterranean fruit flies. On April 23, Federal and State Quarantine and Plant Pest Control officials arrived in Miami to initiate an intensive survey to establish limits of infestation, and State regulations were invoked on that same day to prevent movement of infested products. By October 31, infestations had been found in 28 counties.

An idea of the potential cost of permitting the Mediterranean fruit fly to become established in Florida or other States may be gained from some of the following estimates of losses in other countries. In Greece, as much as half of the citrus crop has been lost in some years because of this insect. In Sardinia in 1950, 30 percent of the peach crop was lost, and apple, pear, and orange crops were seriously damaged. In areas of Africa and South America, the pest has made commercial fruit production difficult, if not impossible. In addition to jeopardizing the multimillion dollar value of the Florida citrus crop, as well as the value of other susceptible crops produced in that State, this insect could cause damage running into millions of dollars each year if its unrestricted spread were permitted to neighboring States such as Georgia, for instance, where the peach crop is a valuable asset to the agriculture of that State and has an annual value of from \$8,000,000 to \$10,000,000; South Carolina, where much the same is true, or States along the Gulf Coast where citrus and other fruit and vegetable crops have an enormous value.

Nature of Pest: The Mediterranean fruit fly probably can produce about 10 generations a year in Florida. It has four life stages--adult (fly), egg, larva (maggot), and pupa. The adult is a little smaller than a house fly. Its body is yellow, tinged with brown. The upper part of the section of the body that bears the legs is marbled with shiny black splotches. The abdomen is oval; it has two fairly broad silvery bands. The wings usually are extended and slightly drooping; they are colorless except for brown or black markings. The adults usually live 30 to 60 days. They are strong fliers.

The female adult pierces the skin of a host fruit with the needlelike ovipositor (or egg-laying apparatus) at the end of her abdomen. She then deposits 1 to 10 eggs in this puncture. This same egg puncture may be used by other Mediterranean fruit flies; several hundred eggs have been found in a single cavity. When conditions are favorable, female flies probably lay an average of about 300 eggs during a lifetime.

* (Ceratitidis capitata)

The tiny, elongate, glistening eggs are barely visible. They hatch into larvae in two to four days. The larva is a slender, cream-colored maggot. It completes its development in 7 to 11 days. When the larva is mature, it leaves the fruit and enters the soil. It may drop to the ground from the fruit on the trees; usually, however, the fruit has dropped to the ground by the time the larva is mature. Larvae can travel short distances. They curl the middle part of their bodies upward and jump four to five inches from this looped position.

In the soil the larva changes into a pupa. The pupa changes into a fly in 8 to 14 days, after which the fly emerges from the soil. The flies become sexually mature in about seven to nine days. They mate, the female lays eggs, and the life cycle has begun again.

Quarantine: Federal and State quarantine regulations to prevent the spread of the Mediterranean fruit fly to uninfested areas were put into effect promptly after the discovery of the 1956 infestation. Federal quarantine regulates movement from Florida to other States of any articles that may harbor the insect. State regulations control movement of these articles to uninfested parts of the State.

Regulated articles consist principally of: (1) Fruits, vegetables, and other garden and orchard products; (2) sand, soil, earth, peat, compost, and manure; (3) fruit-picking equipment; (4) trucks, wagons, cars, aircraft, boats, and other means of conveyance, and containers used in conveying fruits or vegetables; (5) other products and articles that have been associated with the production of or commerce in fruits and vegetables or that have been or are contaminated with sand, soil, earth, peat, compost, or manure.

Federal inspectors issue certificates for the transportation of regulated articles under one or more of the following conditions: (1) The articles have not, in the judgment of an inspector, been exposed to infestation; (2) they have been examined by an inspector and found to be free from infestation; (3) they have been treated under the observation of an inspector according to approved methods that make the articles safe to transport into uninfested areas.

Citrus fruit, for example, may be made safe to transport by fumigation with ethylene dibromide. This treatment is faster and less expensive than either of the two treatments--vapor-heat process and cold storage--used in the 1929-30 eradication campaign.

Control: A recently perfected bait spray, which is applied to vegetation by airplanes and ground sprayers, is one of the main weapons being used in the fight against the adult insect. Properly applied, this spray is not harmful to human beings. The spray contains both a poison (malathion 25 percent wettable powder) and a bait (enzymatic protein hydrolysate or sauce base). The bait contains certain essential fruit fly nutrients that make it attractive to the flies. Deposits of this spray usually attract twice as many females as males. Because flies seek out the poison bait, complete coverage of each tree or plant is not necessary for effective application of the spray. Also, less poison is required to make this spray than is needed in contact sprays that must hit each insect to be effective.

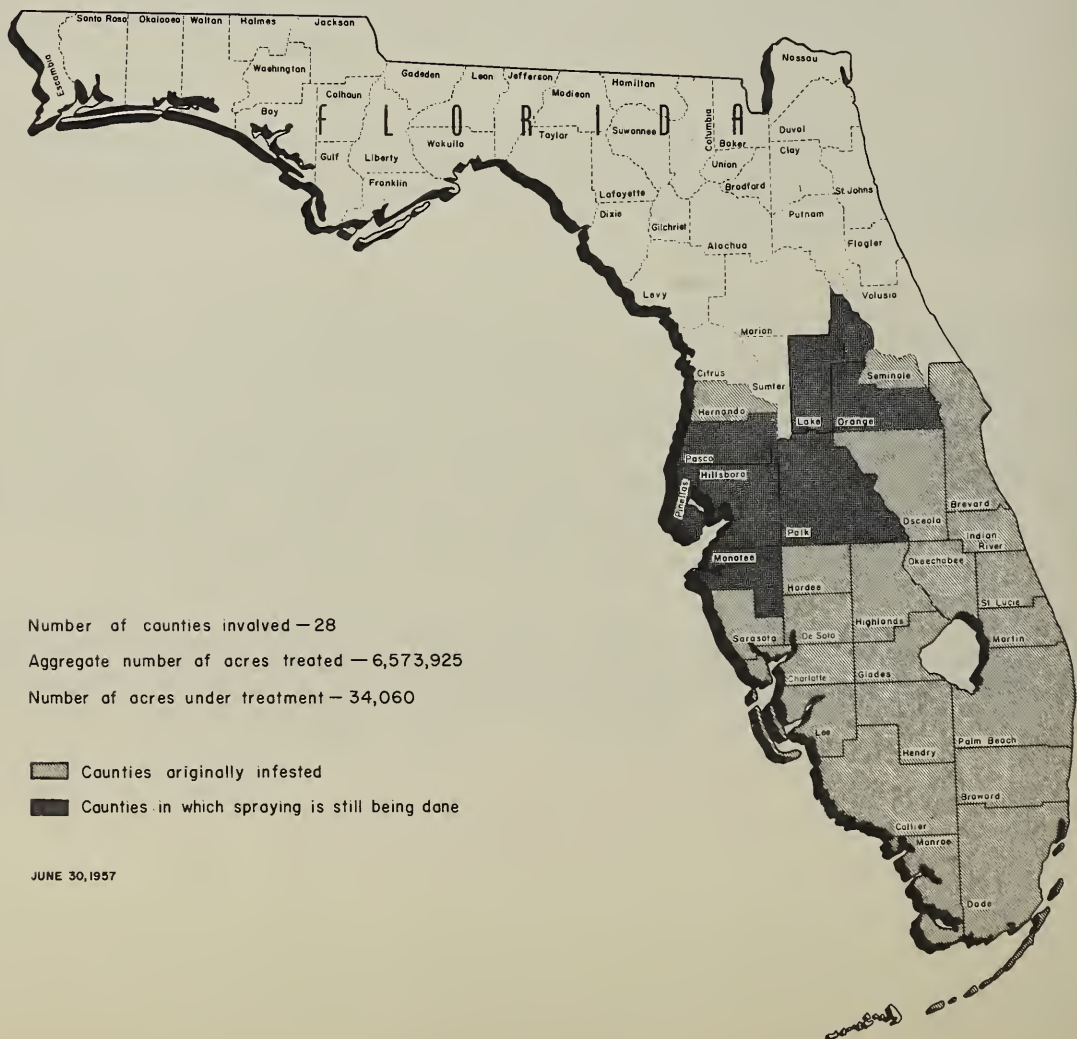
To make spray enough for one acre, one pound of protein hydrolysate or one quart of sauce base and two to three pounds of malathion 25 percent wettable powder are mixed with one gallon or more of water. The bait spray is

applied uniformly over all of an area. It is applied as a coarse spray; a drenching spray is not necessary. Spray deposits on foliage are more attractive to the flies than deposits on the trunks, limbs, or fruit of the trees. The bait spray is applied at intervals of 10 to 14 days. The length of time allowed between spraying depends on the frequency and intensity of rain and on other climatic conditions.

Insecticides applied to the soil will kill some larvae as they enter the soil to pupate and most of the adults as they emerge from the soil. In the infested area in Florida, granulated dieldrin or granulated heptachlor is being applied as a supplement to other control measures.

Accomplishments, Fiscal Year 1957: During the period July 1, 1956, to June 30, 1957, approximately 800,000 acres were treated with bait sprays. Repeat treatment in the area found infested resulted in the application of bait sprays to an aggregate of slightly more than 6,000,000 acres during the fiscal year; and in addition, soil treatments were applied to approximately 23,000 acres during the same period. At the height of trapping operations, some 50,000 plastic traps were in operation in the State of Florida. Traps were in operation, also, in the States of Alabama, Georgia, Louisiana, Mississippi, South Carolina, and Texas during the same period, but in this latter group of States, all catches were negative insofar as Mediterranean fruit fly is concerned. By the end of fiscal year 1957, the insect apparently had been eradicated from 21 of the 28 counties, and populations had been greatly reduced in the other 7 counties.

MEDITERRANEAN FRUIT FLY ERADICATION AND REGULATORY PROGRAM



MEXICAN FRUIT FLY

History: The Mexican fruit fly (*Anastrepha ludens*), a native of north-eastern Mexico, appeared in southern Texas in 1927. One fly was taken in Southern California in August 1954. During 1954, fruit flies were trapped at regular intervals from January to November in northern Baja California, Mexico.

Nature of the Pest: The Mexican fruit fly attacks citrus and a variety of other fruits. The female pierces the rind of the fruit and lays numerous eggs beneath. When the eggs hatch, the larvae feed until the fruit falls to the ground. The larvae, when full grown, leave the fruit and go into the ground to pupate, followed soon by the emergence of adults. Three to five generations may occur in a year. Each year the insect migrates from northeastern Mexico into Texas during the fall. Data indicate that these flies move into California from northern Mexico as a result of shipment of infested fruit.

Survey, Quarantine and Control: The control program has three objectives: (1) Enforcement of Federal Quarantine No. 64 to prevent the spread of the pest from the infested area in southern Texas to other fruit-growing sections; (2) cooperation in California and northwestern Mexico in a campaign to eradicate the light infestation near the International Border; and (3) cooperation with the Mexican Department of Agriculture in enforcement of the Mexican quarantine in the northern part of Baja California and Sonora. The Plant Pest Control Division is cooperating in the following phases of the program: Enforcement of quarantine regulations, inspection of groves and trapping for detecting infestations and treatment of infested fruit moving from the regulated area.

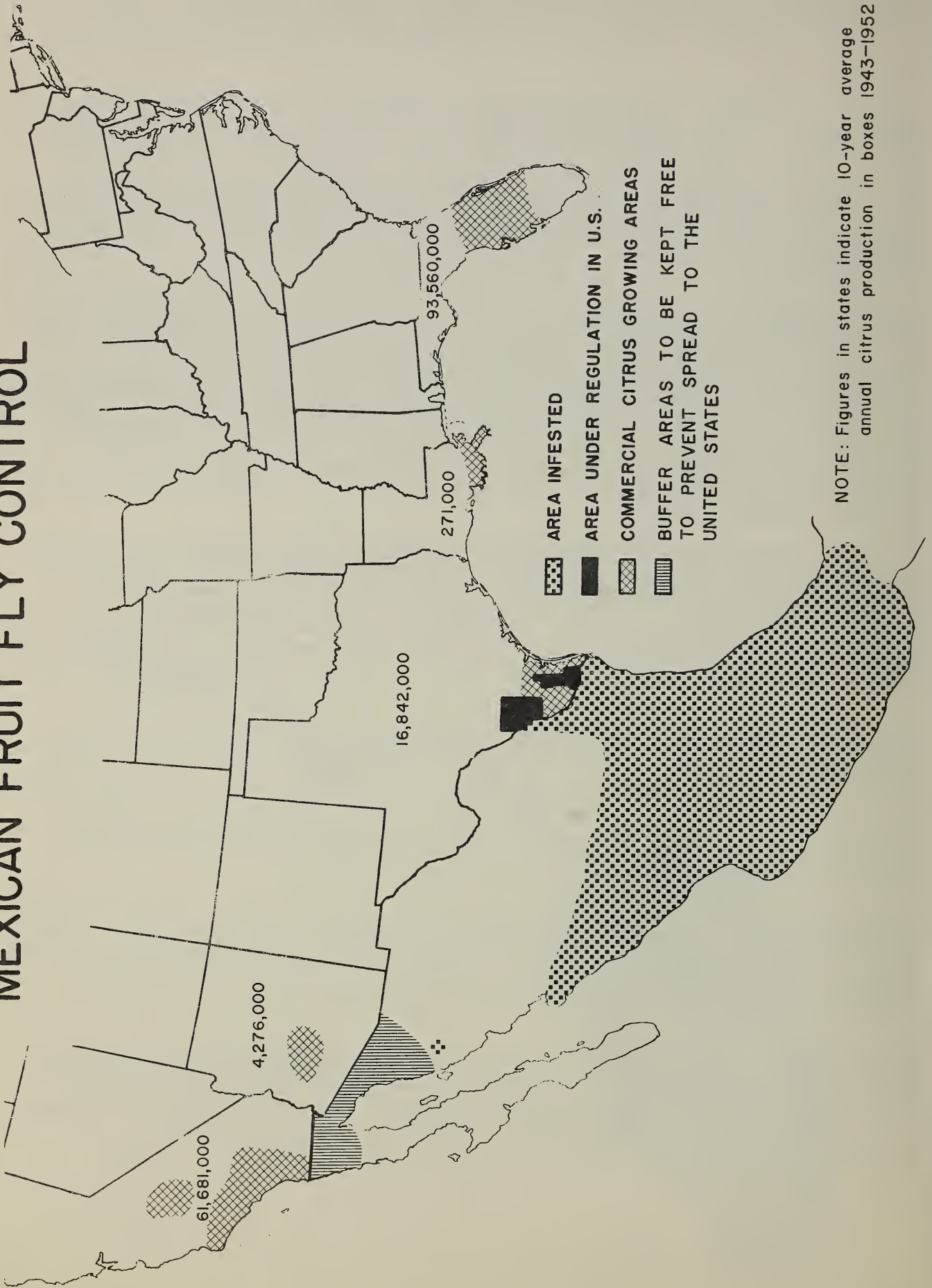
The pest has spread over the Republic of Mexico. The current losses to the citrus and mango fruit growers of Eastern Mexico run from an estimated 8 percent to 38 percent of the crops. No economic losses to the fruit industry have occurred in Baja California, Mexico or the States of California and Arizona, U. S. A. Although fruit flies have been trapped in these areas, no infestations have been permitted to become established. In recent years, fruit losses in Texas attributable to this fly have been very low.

Accomplishments, Fiscal Year 1957: In Texas traps were operated on 298 properties in 6 counties, and larval inspections were made in 2,310 groves throughout the counties of the regulated area and in several counties outside, but near the regulated area. Infestations were found on 73 properties by larval inspections and 51 properties by trap inspections. A total of 162,149 boxes of fruit were treated before shipment from regulated area. Ethylene dibromide fumigation in properly constructed gastight rooms for an exposure period of 2 hours, was the method used.

In California a total of 137,744 properties, 907,022 trees, and 3,207 acres of brushland were sprayed. The results of Federal, State and County cooperation were, in terms of monthly averages, 3,027 traps used, 689 properties trapped and 12,439 traps inspected. A total of 45,331 properties were inspected by all Agencies. No infested fruit was found in California or Arizona.

In Baja California, Mexico, 14 fruit flies on 13 properties were trapped during the fiscal year 1957. A total of 1,061 traps were operated on 417 properties, and 33,766 trap inspections were made. None of the trapped flies were gravid and examinations of dropped fruits were negative. During this fiscal year 282,107 trees were sprayed on 38,576 properties. The fumigation of 1,252,773 kilos of fruit was supervised.

MEXICAN FRUIT FLY CONTROL



NOTE: Figures in states indicate 10-year average annual citrus production in boxes 1943-1952

PEACH MOSAIC DISEASE

History: Peach mosaic is a serious disease of peach, first recognized in 1931 in Texas and now known to be present in the States of Arizona, Arkansas, California, Colorado, New Mexico, Oklahoma, Utah and Texas.

Nature of Disease: The disease is caused by a virus which is transmitted from diseased to healthy trees by a microscopic eriophyid mite (Eriophyes insidiosus). In the spring newly formed leaves on affected trees become mottled with yellow and short internodes with profuse branching are produced. The surface of the fruit in many varieties is irregular and bumpy. The commercial value of an infected planting may be destroyed within 3 to 6 years. At one time 30,000 infected trees were known to be present in each of the States of California and Colorado. In addition to peaches, the disease affects almond, apricot, nectarine and plum.

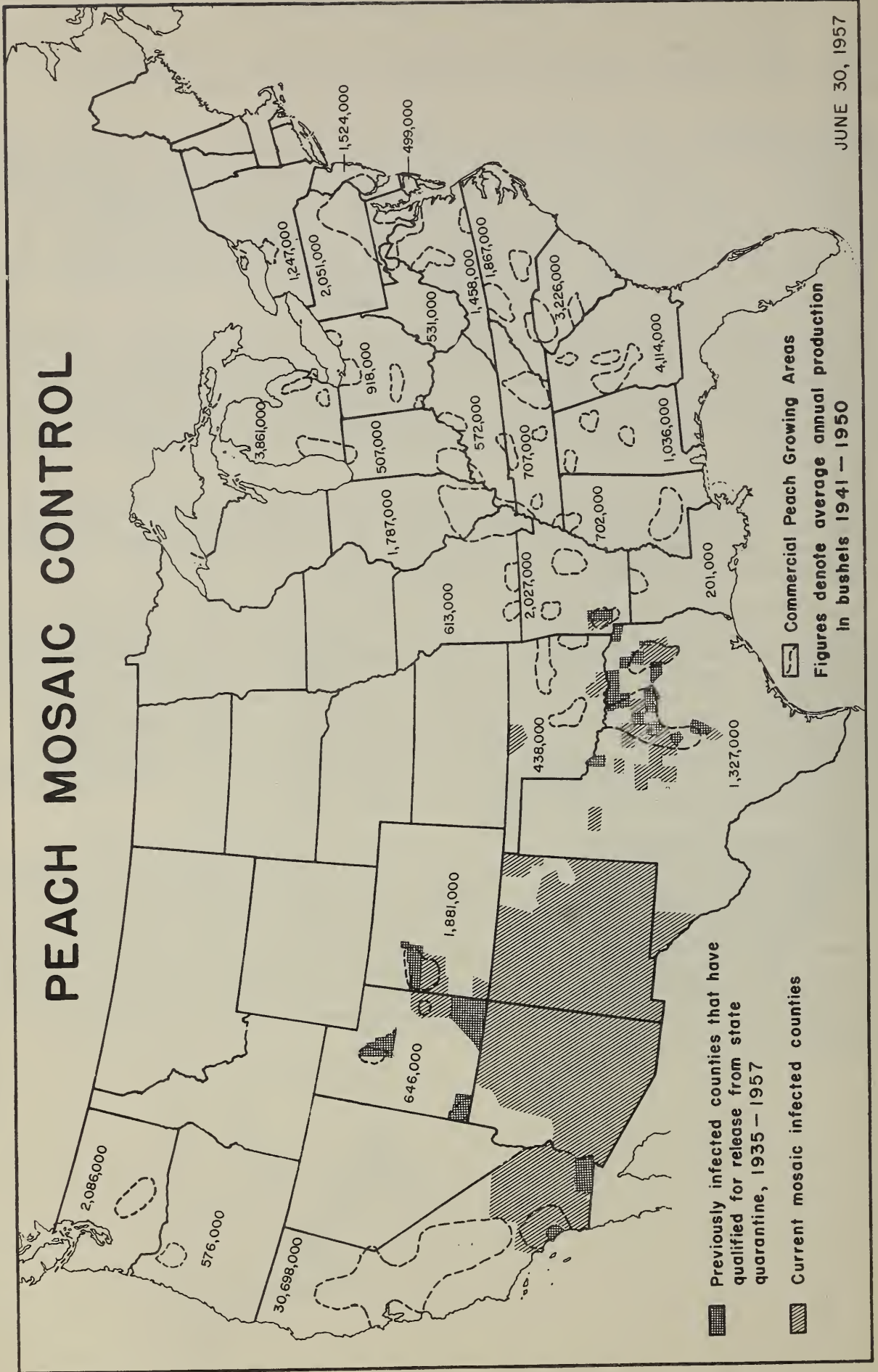
Survey, Quarantine and Control Program: The objectives of this program are: (1) Preventing further spread of the disease by adequate nursery and budwood inspection and uniform State quarantine enforcement; (2) assistance to growers in reducing the incidence of the disease in infected commercial areas; and (3) conducting surveys for the disease in areas where it is not known to occur. The States, the Federal government and industry cooperate in this program.

Control is effected by the prompt removal of infected trees. There has been a reduction in peach mosaic incidence over the total area. Due to quarantine enforcement the establishment of new areas of infection through the shipment of nursery stock and budwood has been prevented.

The mosaic control is considered as a holding program and will continue as such until resistant varieties of peach or improved control techniques are developed. An important need is for the development of a control for the mite vector. Research on the control of the vector of peach mosaic is being done by the Entomology Research Division, Agricultural Research Service, Riverside, California. Phytopathological studies are also being carried on at Riverside, California, by the Horticultural Crops Research Division, Agricultural Research Service. State research agencies in affected areas are cooperating. These studies include testing tolerant or resistant peach varieties to the several strains of the peach mosaic virus.

Accomplishments, Fiscal Year 1957: A total of 2,758,097 trees were inspected, involving 20,558 properties. The activity resulted in finding 8,966 peach mosaic infected trees distributed over 938 properties. By the end of the fiscal year, 5,934 of the infected trees had been removed. A total of 170 nurseries and dealers and two budwood sources were inspected in the peach mosaic regulated area. All except three nurseries and one budwood source met the requirements for certification. Infected trees were found in the Nashville area of Arkansas, and it appears that this is another example of an infestation found several years ago which now may be classified as having been eradicated.

PEACH MOSAIC CONTROL



JUNE 30, 1957

PESTICIDE REGULATORY ACTIVITIES

Objective: The objective of the Pesticide Regulation Section's program is to carry out the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act of 1947. The intention of this Act is to assure the general public that commercial pesticides shall be effective for the purpose for which they are sold, and that they shall not cause injury to the user or to those who may eat treated products, as well as to assure uniformity of regulation. This is being accomplished by requiring correctness of labeling as a prerequisite to registration under the Federal law and by examining samples and taking legal action, when appropriate, against manufacturers shipping improperly labeled or ineffective pesticides in interstate commerce. Close cooperation with the States is maintained in carrying out these functions.

Effectiveness: Since this legislation became operative more than 47,000 products have been Federally registered. During 1957, 4,222 new products were registered; labels were amended for 3,509 additional products, and 1,858 distributors' labels were also registered. In the registration program, which requires a determination of the safety and effectiveness of each use claimed for a pesticide, such determinations are made along general lines at the Federal level and information concerning them sent to the States. The States adapt them to their special conditions, closely cooperating with the Plant Pest Control Division on matters of policy. Federal investigators obtain pesticide samples from interstate shipments; these are examined and when violation occurs, legal action may be taken. A cooperative agreement has been accepted by a number of States by which we are furnished results of their analyses to be used as the basis for possible Federal action. These efforts are resulting in better products and labeling than would otherwise be possible, but leave much to be desired inasmuch as there are still some States which have no pesticide regulatory laws, and many of those which do have such laws are not in a position to cooperate due to limited facilities.

Methods Development: Performance tests carried out at both Federal and State levels and the development of methods of analysis are necessary adjuncts to the regulation of many new pesticides. Such activities, however, must be kept to a minimum because of the immediate necessities of other functions of the administration of the law.

Other Accomplishments, Fiscal Year 1957: In carrying out its responsibilities under Public Law 518 during the year, the Section received 46 petitions for pesticide residue tolerances. Certifications of usefulness and opinion on residues were transmitted to the Food and Drug Administration on 42 of these petitions. To further encourage compliance with Public Law 518, the Section prepared and distributed to all registrants and industry cooperators, a "Summary of Certain Pesticide Chemical Uses." This volume included all registered uses of pesticides on raw agricultural commodities which were covered by tolerances, exemptions, safe chemical classification, or acceptable proof of no residue when the materials were used in line with the particular pattern of limitations shown for them in the Summary. The Summary was extensive in scope, including 147 chemicals and 2,192 uses, at the close of the fiscal year. The preparation and distribution of this volume was a task of considerable magnitude. However, its acceptance as a guide to labeling which would be acceptable under the Federal Insecticide, Fungicide, and Rodenticide Act in light of the limitations of Public Law 518 has been most encouraging. The Section also initiated a practice of notifying applicants for registration as to the changes needed to bring labeling into compliance with Public Law 518, with reference to the Summary for more precise details as needed. Procedures were also instituted for keeping the Summary up-to-date as additional information and label revisions warrant. Considerable effort was devoted to the task of coordinating USDA recommendations and registration actions under the Federal Insecticide, Fungicide, and Rodenticide Act.

PHONY PEACH DISEASE

History: Phony peach disease was first observed at Marshallville, Georgia, about 1885. The disease is thought to be native to the United States. It now occurs in 12 States located east of and including Texas and is serious or potentially serious only where the range of the insect vectors overlaps areas of peach production. It is considered a serious threat to commercial peach production in Alabama, Georgia, South Carolina and in the southeastern parts of Arkansas and Missouri, eastern Texas and northern Louisiana.

Nature of Disease: Phony peach disease is caused by a virus which is known to be transmitted by several species of leafhoppers, one of which appears to be much more important in disease transmission than the others. The disease affects not only peach but apricot, almond, nectarine, and plum. Trees are not killed outright but the fruit becomes progressively smaller each year until production becomes unprofitable. The disease may affect a tree for 18 months before detection is possible; therefore, it is likely that some spread occurs before the diseased trees can be recognized and removed. Discovery that the disease is endemic in wild plums has led to efforts to eliminate plums in the vicinity of peach orchards in order to aid in control.

Survey, Quarantine and Control: Objectives of the control program are: (1) To conduct surveys in wild and cultivated hosts to define areas of infection; (2) to prevent spread of the disease into uninfected areas; and (3) to assist the grower by inspecting his orchards in order that infected trees may be removed and the orchard maintained as a profitable planting. The trees are removed by the grower. Since 1929 more than three million trees have been destroyed by growers because of the disease, and the loss would have been even greater without the organized control program. A Federal quarantine regulating the movement of peach nursery stock was in effect from 1929 to 1934, but it was rescinded and regulation continued under uniform State quarantines established by the infected States.

Control programs are being conducted in commercial fruit-growing areas of Alabama, Arkansas, Georgia, Louisiana, Missouri, South Carolina, and Texas. As a measure of the effectiveness of the present program, there is no long-range spread of the disease through nursery stock and control in commercial orchards is effective where recommended procedures are followed carefully. There has been a progressive decline in infection.

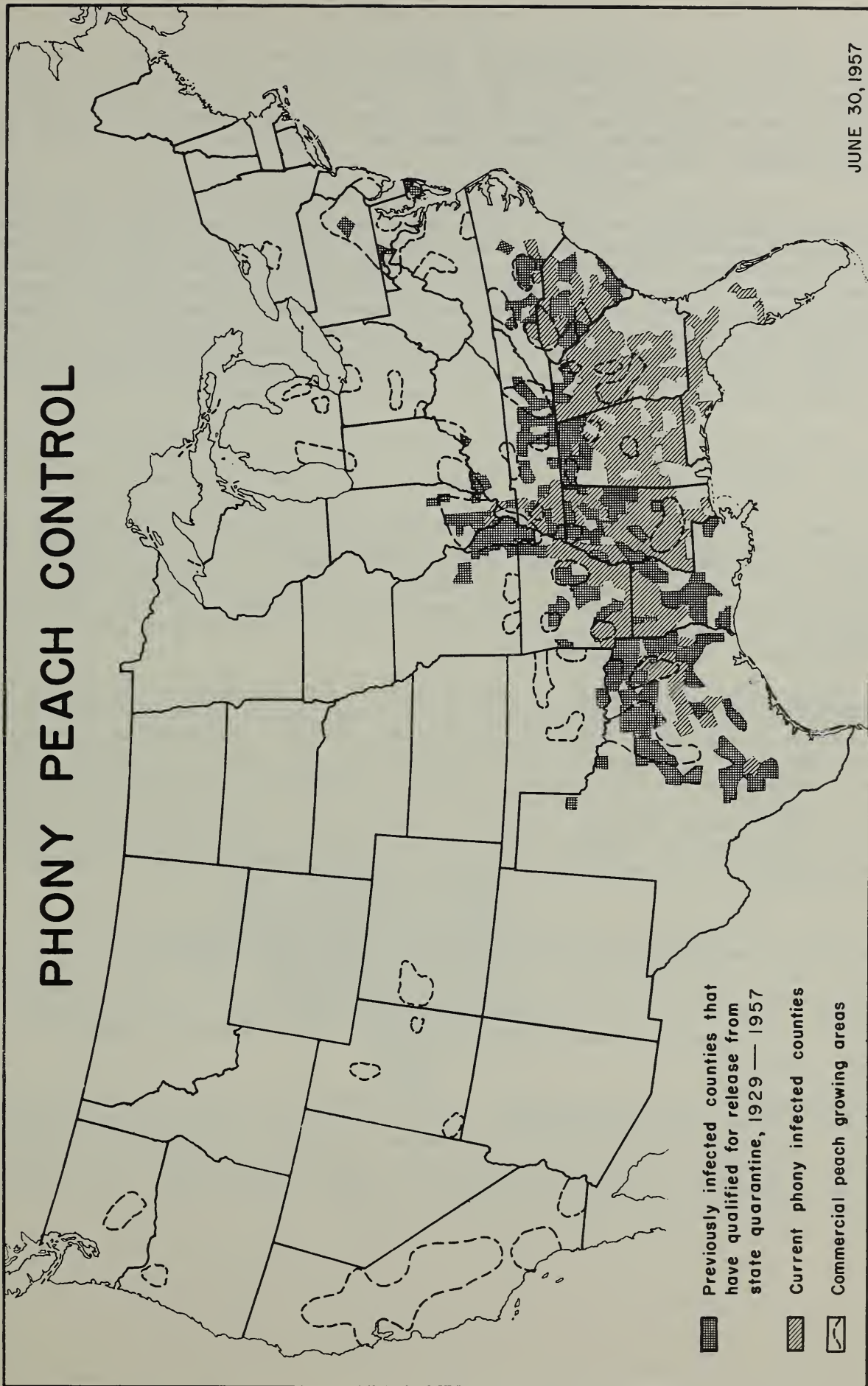
Coordination of the program is carried out by the Plant Pest Control Division which also arranges meetings and distributes information through the Extension Service. State agencies provide the necessary local authority for inspection and tree removal, furnish a portion of the inspectors and labor, and enforce quarantines and regulations.

Accomplishments, Fiscal Year 1957: In peach production areas of Alabama, Arkansas, Georgia, Illinois, Louisiana, Mississippi, Missouri, South Carolina, and Texas, 4,956,044 trees involving 1,575 properties were inspected. A total of 26,285 trees from 8 of these States were found infected with phony peach disease and these were destroyed. Properties found with infected trees totaled 585. Forty-nine peach nursery planting sites were inspected, involving 11,372 trees. Only one phony tree was found as a result of the nursery planting inspections, and it was promptly destroyed.

Wild plum was found within 300 yards of 20 nursery planting sites and all thickets, with two exceptions, were promptly removed. Nurserymen in these two instances planted on other approved sites. Destruction of wild plums, which are native hosts of phony disease, was continued during the fiscal year.

PHONY PEACH CONTROL

JUNE 30, 1957



PINK BOLLWORM

History: Pink bollworm (*Pectinophora gossypiella*) an insect native to India, was introduced from Egypt into Mexico in 1911. The first infestation in the United States was found at Hearne, Texas, in 1917 from large shipments of infested cottonseed from Mexico. The insect now occurs throughout the cotton-producing areas of Texas, Oklahoma, New Mexico, and in parts of Arizona, Arkansas, and Louisiana.

Nature of the Insect: The adults of the pink bollworm are small, grayish-brown moths. Each female lays 100-200 eggs on cotton plants near the base of the squares or bolls. Eggs of the first generation are laid on squares and the larva feeds in the square and is fully grown by the time the bloom appears. Green bolls are preferred for egg-laying and feeding. The eggs hatch in 4-5 days, and the small, pinkish-white larva enters the boll and feeds from 10-14 days. The complete life cycle in the summertime requires 25-30 days. Most of the larvae overwinter in crop residue left in the fields after picking is completed. In addition to cotton, the pink bollworm also attacks okra and a number of other malvaceous plants.

As the pink bollworm feeds inside the green cotton boll it moves from seed to seed, cutting and staining the immature fibers and eating out the seed contents. This results in loss of weight of the seed and lowers the value of the oil. Lint from such damaged bolls is stained, short, and of low grade. Molds may completely ruin bolls in which pink bollworms have left exit holes. Although severe losses in individual fields or small areas have occurred in Texas since the late twenties, the over-all damage has been extremely light. However, unfavorable weather conditions in south Texas interfered with the cultural control program in 1951 and resulted in a large carryover of the pink bollworm and a very heavy infestation in 1952. Damage was estimated at 30 million dollars.

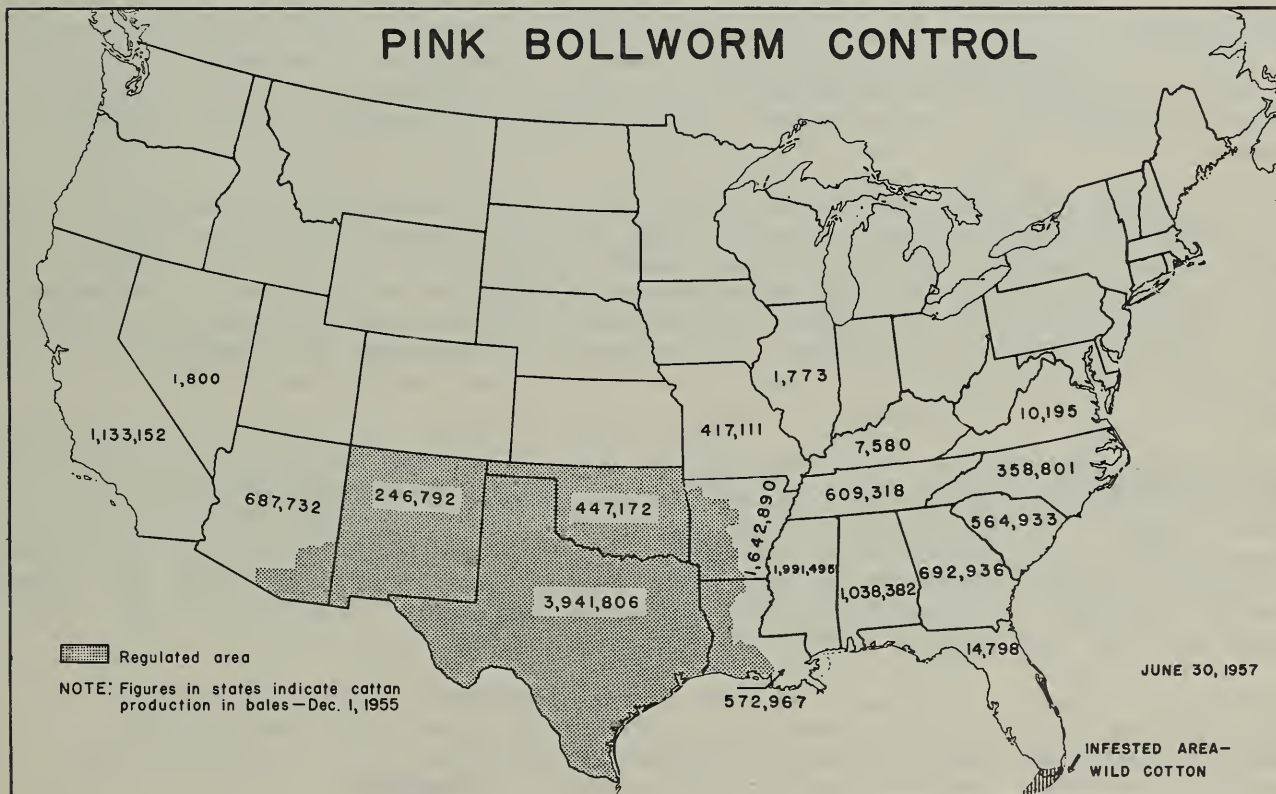
Survey, Quarantine and Control: The objective of the pink bollworm control program in the United States and Mexico is eradication of isolated infestations and suppression of infestations in areas where eradication is not practicable; thereby preventing or retarding spread by moth flights. The current operations include: Annual surveys throughout the cotton belt to locate new infestations and to provide a basis for regulatory and control actions; enforcement of regulations to prevent spread; operation of traffic inspection stations to prevent artificial spread of live pink bollworms; cooperation with the States concerned in suppressive programs to prevent natural spread.

The Division cooperates with Entomology Research and Agricultural Engineering Research, ARS; State regulatory officials; Extension Service; national, State and local trade groups; pink bollworm committees; growers and processors of cotton; and the Department of Agriculture and trade groups of Mexico. Since the pink bollworm was first introduced into the United States in 1917, many isolated infestations in Arizona, Texas, Louisiana, Georgia, and Florida have been eradicated.

Accomplishments, Fiscal Year 1957: Inspections were conducted in 15 cotton-producing States, with infestations being found in six previously infested States. The inspection activity in Alabama, Georgia, Mississippi, South Carolina, Tennessee, Nevada and California was for the purpose of finding incipient infestation before such became firmly established. No infestation was found in these States during the year.

In Oklahoma infestations were found in 50 of 51 counties inspected. Fourteen Arkansas counties were found infested, bringing the total of infested counties to 16. In Louisiana, a heavy infestation developed in the extreme southwestern portion of the State early in the crop year. Through cooperation with State officials, the entire crop in this locality was destroyed as a means of preventing further buildup of population and possible dissemination to other sections. This was a highly successful operation as indicated by the fact that only one additional specimen of pink bollworm was found in the area during the remainder of the crop year.

Inspections in Arizona were limited to four counties, with a total of 16,000 bolls inspected revealing 29 pink bollworms. New Mexico inspections were confined to one county where 42,688 blossom inspections found 169 infested blossoms. Since the entire cotton-producing area of Texas is considered infested, the objective of the surveys therein is to determine any marked changes in the degree of infestation over any substantial area, such information being of assistance in evaluating control measures and in making control measure adjustments as may be required by significant fluctuations in degree of infestation.



PLANT PEST SURVEY

History: Surveys to determine, on a general basis, the abundance of insects and related pests of economic importance was organized in 1952. The program is national in scope but was founded on cooperation with the States. In addition to the general insect survey operations, the control and regulatory programs of the Plant Pest Control Division are given special attention.

The insect pest survey, which preceded the present program, was organized in 1921 when a group of entomologists volunteered to contribute information on incidence of pests in the United States. This was compiled and issued at monthly intervals. In 1950, the Civil Defense Administration asked USDA to use its facilities to combat possible intentional introduction of insects and diseases of livestock, crops and forests. The following year the Bureau of Entomology and Plant Quarantine discussed with various State agricultural agencies the advisability of setting up a "clearing house" for screening insect specimens and reports in each State, and making this information available to the Bureau for a weekly National report. The suggested program led to the development of the present cooperative survey organization with the States. Some of the State programs are organized entirely on a voluntary basis, in addition, others utilize a survey entomologist who is jointly financed by the State and the Division. Jointly financed programs are now in effect in 29 States.

Objectives: Through cooperation of Division officials and various State and ARS Agencies, plans and procedures are formulated for the nation-wide collection, reporting and forecasting of insect abundance. Included in this are operational surveys essential to plant pest control and regulatory programs. In addition, the program aims to obtain information on economic insects to: (1) Supply current information on insect activity to agricultural workers; (2) aid and assure prompt detection of newly-introduced insects through informative compilations that are released individually in the Cooperative Economic Insect Report; (3) develop a workable insect pest-forecasting service; (4) determine losses by insects; (5) provide a nation-wide organization for biological warfare defense as it relates to insects; (6) aid manufacturers and suppliers of insecticides and equipment to determine where supplies are needed; (7) develop nation-wide uniformity in reporting insect conditions; and (8) maintain records on occurrence of domestic and foreign economic insects.

Operational Procedures: Information on occurrence and abundance of insects that is to be summarized and issued in the weekly Cooperative Economic Insect Report is submitted through the State "clearing house" by various cooperators and collaborators in entomology and related agricultural fields. Included are such agencies as State extension, experiment stations and regulatory offices; Plant Pest Control Division and other related Federal agencies, and interested commercial organizations.

Field entomologists and agricultural workers collect and forward pest specimens to the clearing houses for determinations or to the Division where prompt identifications are made through cooperation with the Entomology Research Division and the United States National Museum.

The weekly Cooperative Economic Insect Report has a circulation of approximately 3,000 copies to persons who are concerned with insect pest conditions. Information that is issued in the report is classified and filed in the permanent records of the organization which now include over one-half million notes on some 25,000 domestic and 20,000 foreign insect species. These records are available to Federal and State agencies as well as to the public.

REGIONAL INSECT CONTROL PROJECT FOREIGN TECHNICAL ASSISTANCE PROGRAMS

History: The Plant Pest Control Division since July 1954 has assisted the United States Operations Missions of the International Cooperation Administration and the governments of cooperating countries abroad in the development of practical insect control programs in Lebanon, Iran, Pakistan, Afghanistan, Ethiopia, Tunisia, Iraq, and Libya. Prior to 1954, this program was known as the Regional Locust Control Program and was administered cooperatively by the State Department, the Foreign Agricultural Service and the Bureau of Entomology and Plant Quarantine. The program is filling an important need in the foreign technical assistance programs.

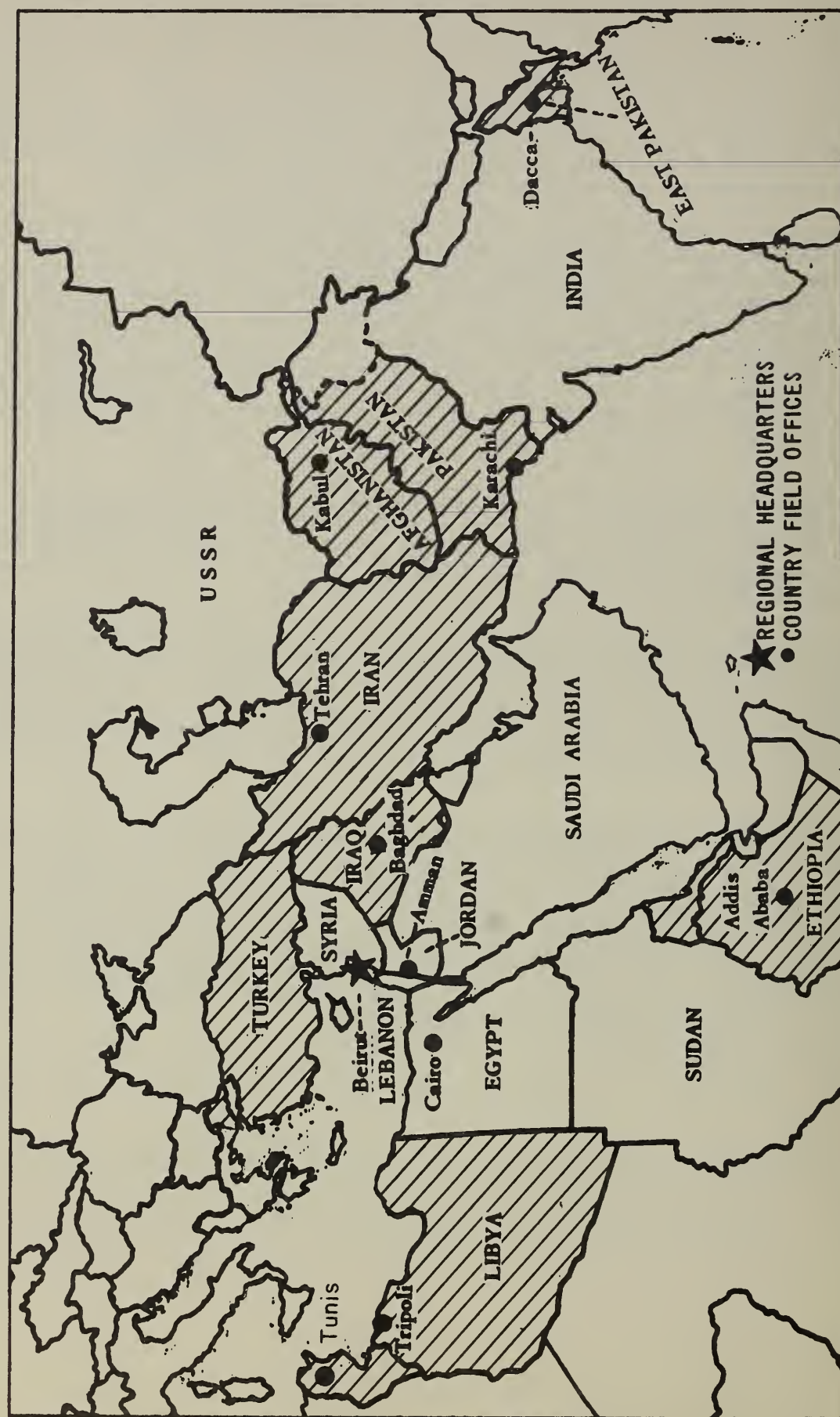
Objectives: The objectives of the Foreign Technical Assistance Programs are: (1) To assist the United States Operations Missions in their efforts to aid the governments of cooperating countries in the development and direction of practical control programs against major insects; (2) to maintain facilities and services for a coordinated locust control program in the Near East, Africa, and South Asian Countries; (3) to train nationals in aerial application of pesticides; (4) assist in the development and organization of plant quarantine programs; and (5) to aid the USOM in developing coordinated insect control programs in the various countries, and to coordinate International Cooperation Administration insect control activities involving cooperation with international and other organizations.

Progress: Because plant protection organizations in the countries currently involved are becoming increasingly conscious of their responsibilities in pest control, they are demonstrating their willingness to cooperate and make improvements. Iran, Iraq, Pakistan and India are now able to handle their locust problems without outside assistance.

The Regional Insect Control Project has active programs in operation in eight countries. Temporary assistance was given to three additional countries in 1957. A staff of ten technicians and four pilot mechanics are conducting a broad program to which has been added the development of plant quarantine programs. The program's operating costs have decreased considerably from year to year since cooperating countries now furnish their own pilots, planes and pesticides.

Accomplishment, Fiscal Year 1957: Approximately 250 species of insects and mites have been reported among those of major importance. Forty-eight demonstrations on 27 different crops were conducted for controlling 39 kinds of insects on a total area of 41,310 acres and 52,225 fruit trees. Sixty-nine meetings were held on plant protection, attended by 3,870 people. Twenty-nine pilots, 28 mechanics, 42 local officials and 55 extension workers were trained. This resulted in the importation of 3,786 hand and power sprayers, 15 airplanes, 1,763 tons of 50 kinds of insecticides in seven countries. For each U. S. dollar spent, the plant protection departments spent an average of \$10.20 during the past fiscal year.

REGIONAL INSECT CONTROL PROJECT FOREIGN TECHNICAL ASSISTANCE PROGRAMS



SOYBEAN CYST NEMATODE

History: The soybean cyst nematode (*Heterodera glycines*) occurs in Japan, Korea and China (Manchuria) in Asia. It was discovered in this country at Castle Hayne, New Hanover County, North Carolina, in 1954, and was subsequently found in Crittenden and Mississippi Counties, Arkansas; New Hanover and Pender Counties, North Carolina; Lake, Obion, Dyer and Lauderdale Counties, Tennessee; New Madrid, Pemiscot, Stoddard Counties, Missouri; and Fulton County, Kentucky.

Nature of the Pest: The nematode is a microscopic roundworm which penetrates and feeds inside rootlets. Later, females emerge but remain attached to the rootlets. A cyst is formed containing about 400 eggs. When the eggs hatch, the larvae emerge from the cyst and continue the cycle. A life cycle is completed in about three weeks and five generations may be produced in one crop of soybeans. Soybean and Adzuki bean are highly susceptible hosts, while snap beans, common vetch and lespedeza are less susceptible. Three new host plants are hemp sesbania, white lupine and henbit deadnettle. Improved crowder pea and salvia are suspected hosts.

Severely attacked soybean plants become yellow and stunted. Lightly infested plants show few symptoms. Severe infestations may lower yields to a point where crops might not be worth harvesting. If this pest is allowed to spread, it could become a serious hazard to commercial soybean production throughout the United States.

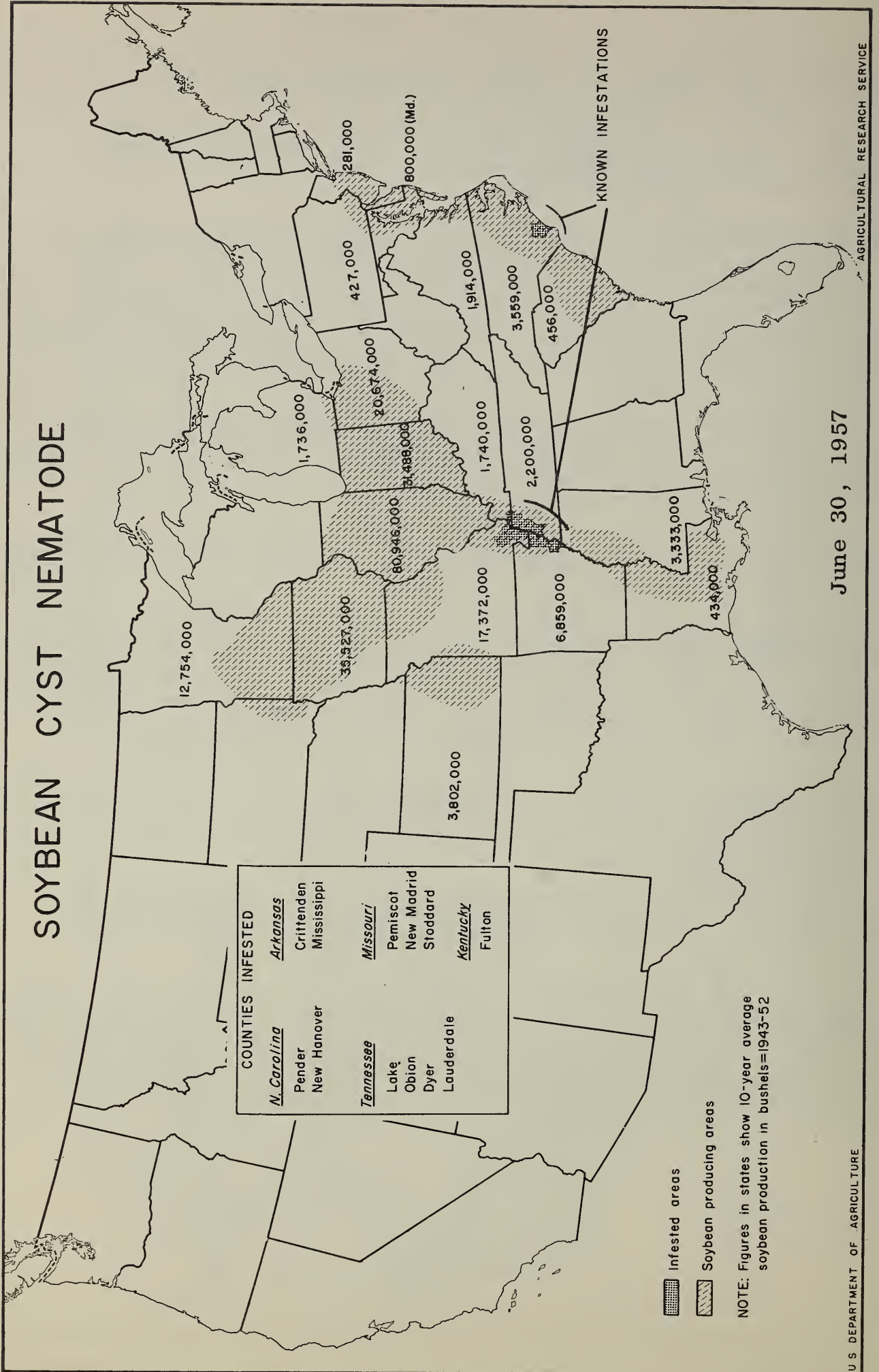
Objectives: The purpose of the program is to define infested areas; to survey for presence of the nematode in other soybean areas; and to prevent its spread into non-infested areas.

Survey, Quarantine and Control: From July 1956 to July 1957, soil inspections were conducted on 107,572 acres in the Southern and Central Regions. In addition to these surveys, plant inspections were conducted on 115,887 acres in other areas. Additional studies are being conducted on the life history of the pest, evaluation of various nematocides in broadcast and row treatments, tests on varieties and selections of soybeans for resistance to soybean cyst nematode and tests to determine any additional host plants.

Crop rotation has been used as an effective means of preventing the spread of the pest. The longer the period between planting of a host crop, the better the chances that light infestations will not survive. It is believed that a three to five year rotation will stop the buildup of soybean cyst nematode in soybean fields.

The Federal quarantine to prevent spread of the pest was put into effect July 26, 1957. Each State concerned has issued or is expected to issue a parallel State quarantine to protect uninfested areas within its own boundaries.

Accomplishments, Fiscal Year 1957: By the close of the fiscal year 3,197 properties involving 107,572 acres had received a soil survey inspection for soybean cyst nematode infestation. Growing-plant inspections had been made covering 115,887 acres involving 4,722 properties. As a result of these inspections, soybean cyst infestations were confirmed on 5,431 acres involving 99 properties located in portions of Missouri, Arkansas, North Carolina, Tennessee and Kentucky.



SWEETPOTATO WEEVIL

History: The sweetpotato weevil (*Cylas formicarius elegantulus*) was first recorded in Louisiana in 1875 and shortly thereafter in Florida and Texas--indicating that it was introduced through several Gulf Coast ports at about the same time. It came from Asia. At present it is known to occur in Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina and Texas.

Nature of Pest: The egg of the beetle is minute, yellowish-white and oval in shape. The larva is a white, legless grub with a brown head and when full-grown measures about 1/4 of an inch in length. The adult is a snout beetle, ant-like in appearance and about the same length as the full-grown grub. It is dark metallic blue on the head, snout and wing covers, with prothorax and legs of reddish-orange. Adults and grubs feed on sweetpotatoes in the field and in storage. Adults prefer the tuberous root but will feed on leaves and vines. The grubs cause the principal damage by burrowing through the potato, leaving it with a bitter taste and unfit for human, and sometimes for animal, consumption. Growers frequently have losses ranging from 20 to 50 percent of the crop in the field and an additional damage in storage. The weevil is so abundant in some sections that sweetpotatoes cannot be grown profitably. An estimated \$3,000,000 loss from the insect has occurred in a single year in Louisiana.

Survey, Quarantine and Control: The objectives of the program are: (1) To eradicate the weevil in outlying infestations; (2) to suppress populations in areas of heavy commercial production; and (3) to prevent its spread into uninfested areas. These objectives are carried out by making surveys to locate outlying infestations, by establishing non-sweetpotato growing areas, by conducting a cooperative control program in areas of heavy commercial production, and by treating sweetpotatoes shipped from infested areas.

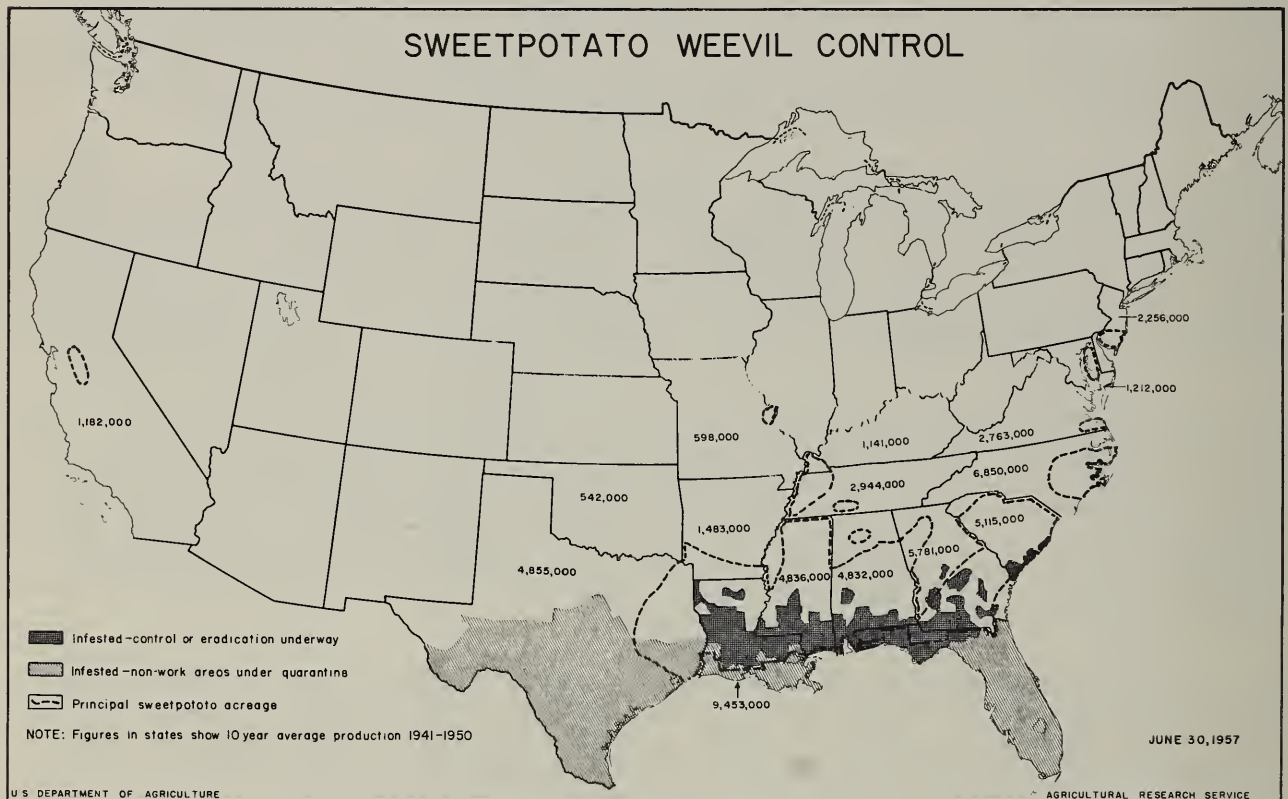
Alabama, Georgia and Mississippi established sweetpotato weevil control programs in 1937, Louisiana in 1944 and South Carolina in 1946. The control program includes planning and direction, technical assistance, demonstrations, surveys, eradication measures, suppressive measures in areas of heavy commercial production and quarantine enforcement. For the past several years, cooperating States have contributed about 75 percent of program costs. State funds have averaged more than 65 percent of the total funds expended since the program started.

The work program has eliminated the sweetpotato weevil from thousands of farm units in cooperating States, and it has reduced the economic losses in some years as much as \$2,750,000. Recent approval of new insecticides for control of the weevil will permit relaxing planting restrictions in many areas and will make it possible for the grower to control the weevil on his own property.

Accomplishments, Fiscal Year 1957: Due largely to increased manpower made available by reorganization of program operations, it was possible to inspect 37 percent more counties than the previous year. New infestations found were down 8½ percent from those of the previous year, counties found infested for the first time were down 54½ percent, and apparent eradication was found to have been accomplished in eight counties. There was a 12½ percent increase in the number of properties released. In addition, crop losses were reduced by approximately \$250,000.

Surveys were made in Alabama, Florida, Georgia, Louisiana, Mississippi, and South Carolina where a total of 122,905 properties were inspected; 2,218 of which were found infested and 2,055 of which were released from infested status. Other activities during the year gave attention to 15,241 storage facilities and kilns, 15,098 seedbeds, 18,141 acres, and 1,401,646 bushels of sweetpotatoes.

Various phases of the sweetpotato weevil program are currently conducted in 106 infested counties in the above-named States. Because of the effectiveness of insecticide field treatments, sweetpotato growing is being expanded in northwest Florida, in Louisiana, and to some extent in other Southern States.



WHITE-FRINGED BEETLE

History: The white-fringed beetle* was first found in the United States in northeast Florida in 1936. It was probably introduced from South America where it occurs in Argentina, Brazil, Chile and Uruguay. Now it infests about 600,000 acres in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee.

Nature of the Insect: All white-fringed beetles are wingless females. Emergence of the beetles from the soil begins in late May and continues into September and October. A few days after emergence the beetles begin laying eggs, cementing them in small masses to plant stems, sticks, debris or soil particles. Lumber, building materials, cotton bolls, seed cotton, velvet-bean pods, farm implements and other such articles in contact with the soil may have eggs attached to them. The grubs that develop from the eggs feed on roots and underground stems of young plants in the spring. They gnaw the taproot and bottom part of the stem, but feed very little on laterals. Grubs and adults have been observed feeding on over 385 species of plants, important ones of which are cotton, corn, soybeans, velvetbeans, peanuts, potatoes, sweetpotatoes, tobacco, strawberries, kudzu, lespedeza, lupine and oats, and on the roots of peaches, pecans, tung, and willow.

In some fields up to 70 percent of the plants have been killed in areas ranging from a few square yards to large acreages. Even light populations can seriously damage truck crops. The threat of the pest is emphasized by the great variety of plants attacked, which include almost every major crop plant of the nation.

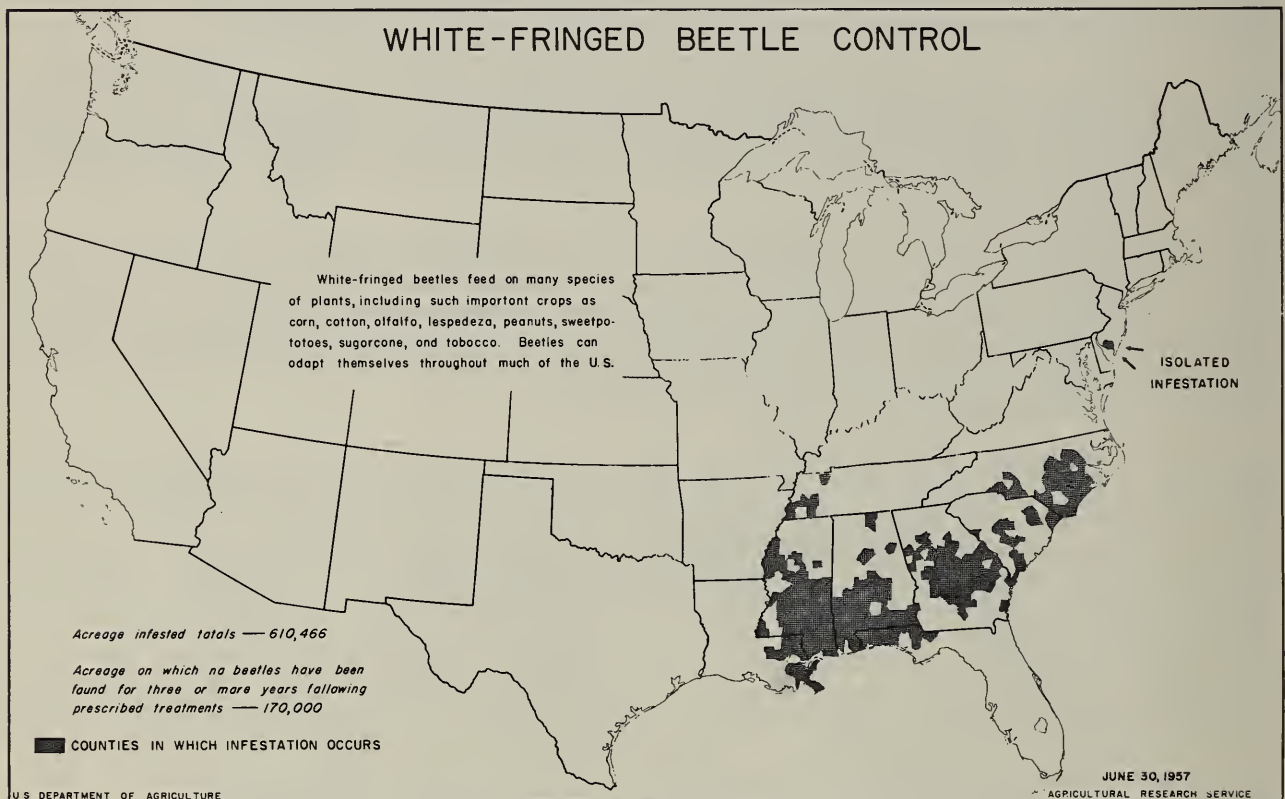
Quarantine and Control: Objectives of the program fall into three categories: (1) Surveys in regulated areas to determine the degree of infestation on which regulatory and control requirements are based; (2) surveys in uninfested areas; (3) enforcement of Federal and State quarantines; (4) suppression and eradication of infestations to prevent spread of the pest and to assist the grower in preventing losses.

Various emergency methods such as ditching, trap crops and flame throwers were used originally, followed by the use of calcium arsenate and cryolite as foliage applications. DDT is now used both as soil and foliage treatments and dieldrin, chlordane and heptachlor also have been approved, giving rise to the possibility of eradication of the beetle in a given infested area through their effectiveness. Of the approximately 600,000 acres classed as infested in 1957, resurveys show that only 6.4 percent of the acreage supported heavy infestations and no specimens were found on 31.5 percent, the remainder had light to moderate infestations. Of 23,000 acres infested in Louisiana, no specimens were found on 19,000 acres and only five acres had heavy infestation. Effectiveness of treatment is demonstrated by the fact that infestations have been kept at a low level, spread of the beetle has been retarded and extensive crop damage prevented.

Accomplishments, Fiscal Year 1957: In the Eastern Plant Pest Control Region State and Federal personnel conducted intensive surveys covering virtually every foot of the previously known infested areas during July, August, and September of 1956 and May and June of 1957. More than 1,800 man-hours were spent in this work, including observations for new infestations in adjacent vicinities. In November 1956 a total of 117 soil samples were taken from previously known infested ground and some adjacent areas and processed in an effort to recover white-fringed beetle larvae. All samples were found negative. The procedures used in survey and in the collecting and processing of soil samples, were the same as used in the Southern Region. Survey and scouting included an examination of 3,865 properties in New Jersey and surveys of a more cursory nature were made in Virginia, Maryland, and Delaware.

* (Graphognathus spp.)

All States in the Southern Region except Oklahoma were surveyed, and infestations were found in all States except Arkansas and Texas. Properties found infested included 16 nurseries and 5,872 other properties. No infestation was found on 40,211 other properties inspected in the 10-State area. New infestations involved 97,419 acres on 968 properties in eight States. More than half, or 57,724 acres, of the newly found infested acreage was in the State of Alabama; 14,642 acres in Georgia; 13,354 in Florida; 7,082 in Mississippi; 3,690 in North Carolina; 484 in Tennessee; 257 in South Carolina; and 186 in Louisiana. Insecticide treatments were applied to 2,435 acres of nursery lands, 10,193 acres of farmland received broadcast treatments, and 28,192 acres of farmland received fertilizer-insecticide treatments. Most of the fertilizer-insecticide treatments were in the State of Alabama, where 24,588 acres were so treated. Of the nonfarmland, 15,002 acres received surface applications and 61,258 aggregate acres received foliage treatments.



WILD COTTON ERADICATION

History: Wild cotton plants and dooryard cotton in Florida are hosts for pink bollworm, a serious migratory pest of cotton and okra. Pink bollworm was found in wild cotton and ornamental or dooryard cotton plants of southern Florida in 1932.

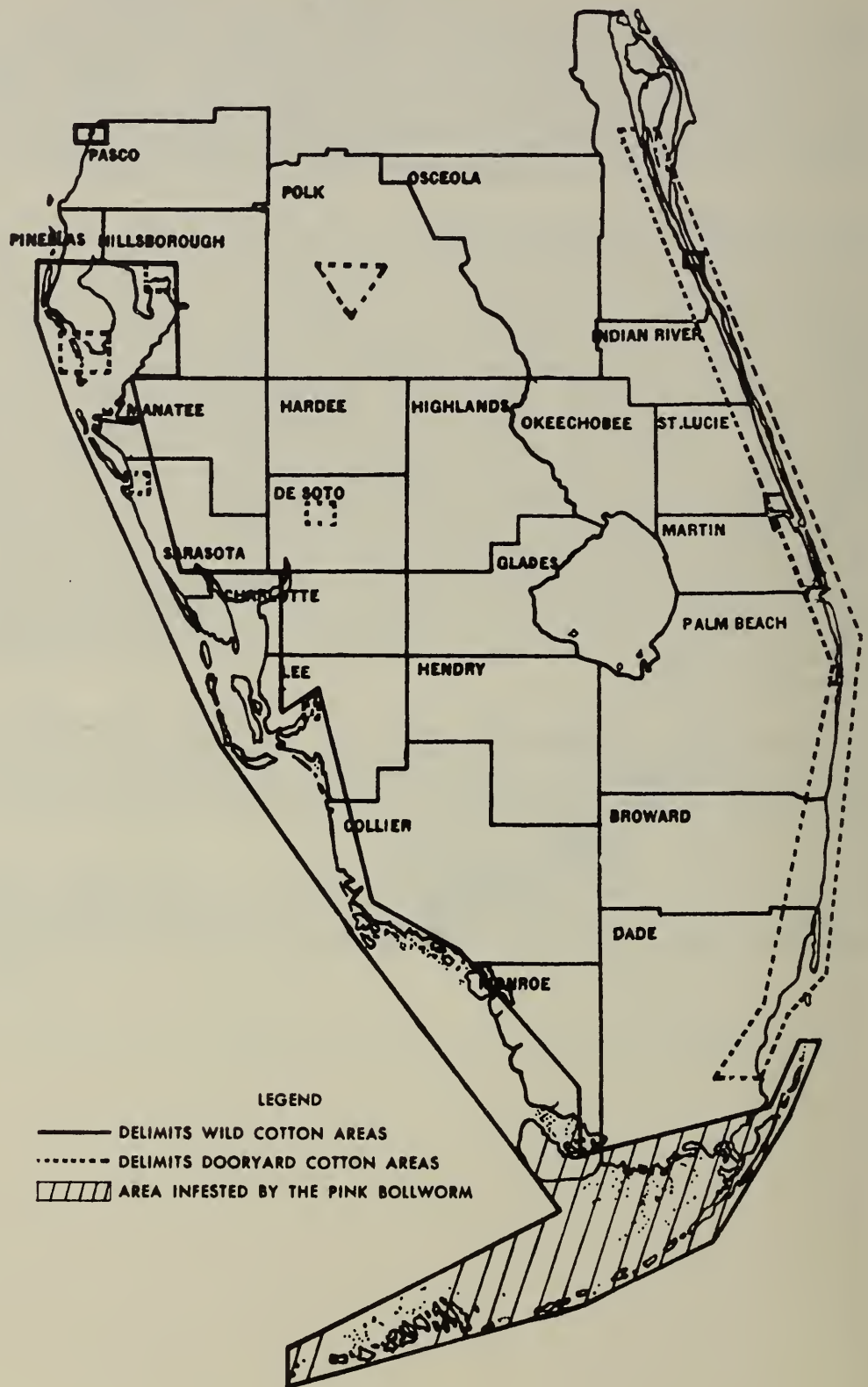
Nature of Problem: Wild cotton and dooryard cotton in southern Florida were considered to be the source of pink bollworm infestations in commercial cotton in northern Florida and southern Georgia during 1933. Rigid quarantine regulations in those cotton-growing areas reduced considerably the danger to the Southeastern States by 1937. Although cotton is not grown commercially in southern Florida, its widespread occurrence as an ornamental and as a wild plant provides hosts for the pink bollworm.

Objective and Status of Program: The objective of the wild cotton eradication program is eventually to eradicate pink bollworm from southern Florida. By creating a host-free period during the dry season of the year, it is possible to hold the degree of infestation to a minimum and so decrease the possibility of reinfestation of a commercial cotton in the Southeastern States. Originally, infestations in wild cotton were very high on the mainland of Dade and Monroe Counties and in the outlying keys. As the removal of wild cotton plants progressed, infestations of pink bollworm dropped to less than one percent from a high of over 30 percent in some areas. When no funds for wild cotton work were appropriated in 1947-48, infestations of pink bollworm built up to as high as 70 percent in some of the mainland keys in Monroe County by 1949. Current operations involve searching out previously known cotton colonies and destroying all mature plants. The fruit is carefully collected and destroyed to prevent new growth from seed and at the same time to destroy pink bollworm present in the bolls. Of over 900 known cotton colonies, over 500 can be reached only by boat through very shallow waters. Plants are destroyed by pulling or by use of sodium arsenite. To be effectively controlled, cotton colonies must be cleaned out twice per season.

Accomplishments, Fiscal Year 1957: In an area involving 11 coastal counties in the State of Florida extending from Hudson in Pasco County to offshore islands 20 miles west of Key West in Monroe County, 25,220 acres of island and jungle lands were cleaned. This involved the destruction of 40,107 wild cotton plants.

Infestations of pink bollworm were found in only three colonies of wild cotton in 1957. Nine specimens were discovered on Plantation Key and three additional ones found were in two colonies in the Cape Sable area.

WILD AND DOORYARD COTTON ERADICATION SOUTH FLORIDA



June 30, 1957

WITCHWEED

History: Witchweed (*Striga asiatica*), a parasitic flowering plant, was discovered late in the summer of 1956, seriously damaging corn in adjoining counties in North and South Carolina. While witchweed is a new pest in the United States, it is an old problem in other parts of the world. Witchweed was recognized to be a serious parasitic weed in South Africa in 1900. It is present in large areas of Asia, Africa, and Australia where it was known to exist as early as 1790.

Nature of Pest: It is a serious pest of corn, sorghum, and sugarcane, as well as 60 other species of the grass and sedge family, including rice, wheat, oats, and barley. The weed parasitizes crab grass along roadsides and fence rows, in wasteland and in cultivated land growing cotton, tobacco, soybeans, and peanuts.

Corn, sorghum, sugarcane, Sudan grass and crab grass roots stimulate the germination of witchweed seed and then are parasitized by the witchweed. Other plants, such as peanuts, sunflowers, cowpeas, soybeans, and castor beans, stimulate seed germination but are not parasitized.

Witchweed may be detected by its brick red or scarlet flowers, although they occasionally may be yellowish red, yellow, or almost white. The flowers are small but striking in appearance and easily identified. The plants above the ground are small and bright green, with a yellowish tinge, and the leaves are slightly hairy. The plants rarely grow more than 8 or 9 inches high, although occasionally they may reach a height of 18 inches.

The weed develops for six weeks to two months underground, and it is during that time the principal damage is done to the host. After vegetative parts appear above ground it develops like any other plant but still depends upon the host for water and soil nutrients. While the plant seems to prefer a light sandy soil, it will thrive on a wide range of soil types. Symptoms of infestation include severe wilting, stunting and yellowing of the host plant and eventually the leaves turn brown and the plant dies. Each witchweed plant produces from 50,000 to 500,000 microscopic seed.

Objective: The long range objective of the witchweed program is complete eradication. Methods to be used to accomplish this end include (1) the use of chemical herbicide treatments; (2) cultural practices, such as permitting land to lie fallow or growing catch crops such as corn, sorghum, Sudan grass and sugarcane, or by growing crops immune to infestation. The program initiated during the past year has consisted mainly of surveys to determine the extent of infested areas. Studies were started on development of chemical control plans and some work was done toward encouraging farmers to adopt cropping practices to eliminate witchweed or at least keep it under control.

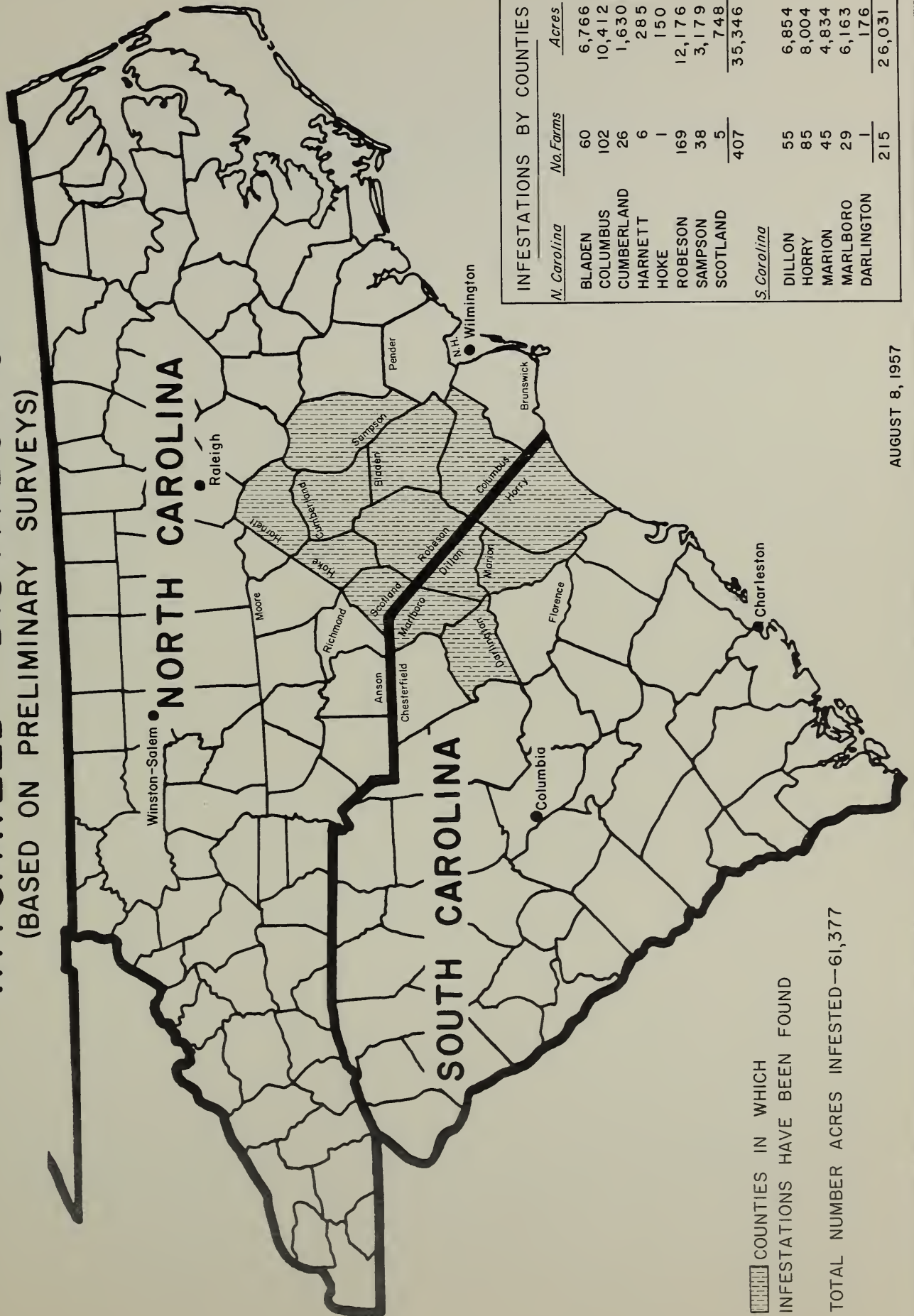
Accomplishments, Year Ended June 30, 1957: After receiving official confirmation of witchweed infestation in the several North and South Carolina counties involved, Division and State plant pest control officials in the affected States met to formulate control plans. A survey under the supervision of the Division was started to determine the severity and extent of the infestation. In the fall of 1956 the Agricultural Research Service developed plans for a research program in cooperation with the affected States to provide information about the life history of the witchweed, its ecological requirements, and its control and eradication.

Control work was started in the Carolinas, using herbicide sprays where plants had appeared above the ground on road shoulders and in noncultivated land. Farmers were encouraged to destroy the weed by plowing, hoeing, or spraying with 2,4,D. During the year ended June 30, 1957, surveys were made in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina, and 46,623 acres on 2,482 properties were surveyed or inspected. Witchweed was found on 8,915 acres on 104 properties in North Carolina and on 3,159 acres on 53 properties in South Carolina, in a total of nine counties in both States. The primary host crops susceptible to this parasite--corn, sorghum, and sugarcane--are valued at \$4 $\frac{1}{2}$ billion annually.

A public hearing was held in January 1957 in Washington, D. C., with representatives from interested States and Department officials to consider the need for a Federal quarantine to regulate the interstate movement of articles or things which would represent a hazard of spreading the pest. Meetings were held by State and Federal quarantine officials with farm groups in the infested counties of the two Carolinas to determine boundaries of the anticipated quarantine, to discuss cropping and marketing practices, the movement of products, equipment and other materials from the area to be covered by the quarantine.

WITCHWEED DISTRIBUTION

(BASED ON PRELIMINARY SURVEYS)



Corrected



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
CENTRAL REGION

ANNUAL PROGRAM REPORT

BARBERRY ERADICATION

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
In cooperation with
State, County, and Local Agencies

October 21, 1957
Minneapolis, Minn.

R. O. Bulger
Regional Supervisor

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I. INTRODUCTORY

A. Statement of Problem

Rust-infected barberry bushes are an important early source of the stem rust that attacks wheat, oats, barley, and rye. The disease develops on the barberry early each spring and spreads to small grains and grasses, often causing serious crop damage over a wide area before harvest. The sexual stage of the rust occurs on the barberry, and it is in this stage that new and occasionally virulent races of the rust fungus are produced. Some of these races attack varieties of grain heretofore considered resistant to stem rust. The barberry-eradication program therefore serves two purposes: (1) eliminates the early source of infection, thus controlling local epidemics; (2) destroys the breeding place of new races of the rust.

Twelve states--Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin--are engaged in the cooperative barberry-eradication program for the control of stem rust. The 12 eradication states comprise an area of over 676,000 square miles, with several million farms and city, town, and urban properties. Barberry bushes are found by systematic foot-scouting of all territory. Areas where fruiting bushes are destroyed are reworked periodically until no new bushes are found.

B. Program Justification Statement

Rust-susceptible grain crops constitute one of the most important sources of farm income in the 12 cooperating states in the Central Region. More than two billion bushels of wheat, oats, barley, and rye are grown on 78 million acres of the best cropland in the United States. These crops have an annual valuation of approximately two billion dollars. Stem rust is the most destructive disease of these crops. Some losses occur every year, and during epidemic years many farmers have had their entire crop wiped out.

C. Program Objective

The program objective is to maintain the barberry-free condition that has been attained in many counties, and to rework infested areas until there is no more regrowth. This is accomplished through informational activities, studies of seasonal rust development, quarantine enforcement, nursery inspection, and periodic inspection of previously infested locations.

D. Changes from Work Plan

There was no material change from the work plan, and all initial work and rework was conducted on schedule.

E. Status of Infestation

Originally 676,180 square miles were scheduled for work in the 12 states in the Central Region participating in the eradication program. In the states of Indiana, Missouri, Nebraska, North Dakota, and South Dakota--with the exception of small isolated areas--the entire states are on maintenance. Several of the other states have a number of troublesome areas with high bush potential. These areas involve some of the most rugged terrain, where barberries have had many years in which to become established, and, because of the heavy seeding, will persist to be a control problem. Rework in these areas will be conducted on a schedule that will eliminate any new bushes before they begin to produce seed.

II. PROGRAM HISTORICAL INFORMATION

The common, or European, barberry was introduced into this country by the early colonists and became widespread throughout the important grain-growing areas in the United States. There also are two native species--Berberis fendleri, found in Colorado, and B. canadensis, in the Virginias. Only small local infestations of the native species have been found in Illinois, Indiana, and Iowa. Even before the Revolutionary War, farmers observed that stem rust was spread by the barberry to grain fields, and laws were passed condemning the pest. However, it was not until 1865 that scientists discovered the direct relationship between the barberry and the rust of small grains. The practical importance of this was overlooked for many years, and not until 1918, after the barberry had become widely distributed and had caused serious damage, was an eradication program started.

The stem-rust fungus is not a simple species, but consists of a large number of strains or races which differ in their ability to attack different varieties of grain. The complex nature of the fungus has greatly increased the work of plant breeders in their attempt to develop varieties resistant to stem rust. The eradication of barberry bushes became of even greater importance when, in the late twenties, science discovered that two existing races can hybridize on the barberry, thus producing new races, some of which may attack varieties of grain that previously were highly resistant to the disease.

Originally, thirteen states in cooperation with the Federal Government inaugurated an active eradication program. Ultimately the area comprised nineteen of the principal grain-producing states in the country. Of this area, twelve states are within the boundaries of the Central Plant Pest Control Region.

During the early years of the barberry-eradication program, many problems were encountered. The most urgent of these was the need for an effective and economical method of eradication. Grubbing and digging were not satisfactory because abundant regrowth developed from root fragments left in the soil. In order to find an effective chemical

that would kill the barberry, extensive tests were made in the early twenties with numerous chemicals, resulting in the use of salt or kerosene. Following many more tests, ammonium sulfamate was adopted in 1944 for field use by applying the chemical to cut surfaces of the barberry canes. This method is very effective for treating isolated bushes. In areas of heavy bush concentration, a chemical formulation of 2 parts 2,4-D and 1 part 2,4,5-T plus pentachlorophenol, applied as a basal spray and ground drench, is highly effective. The use of these new chemicals has eliminated the burdensome job of trucking and back-packing large quantities of salt, and has resulted in a substantial reduction in operational costs.

Through the persistent efforts of the U. S. Department of Agriculture, the State Departments of Agriculture, and other cooperating agencies, there remain 46,181 square miles of the territory originally scheduled for work. These infested areas will require one or more inspections before they can be placed in the maintenance category.

The enforcement of Quarantine 38 has done much to preclude the reinfestation of areas cleared of susceptible barberry. These regulations govern the interstate movement of all barberry and mahonia plants and seeds. The quarantine provisions are so designed as to prohibit the movement into the eradication states of any barberry and mahonia plants that have not been inspected and found to be rust-resistant species.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

Field activities for the barberry-eradication project were conducted in accordance with previously accepted plans jointly agreed upon by the area supervisor and the State officials responsible for this Plant Pest Control program. The area supervisor takes the lead in directing the over-all phases of the comprehensive stem-rust-control work in his assigned area, with frequent consultations with officials of the cooperating agencies.

All planned work this year was completed on schedule. The long-range program can be accomplished with the present annual allotment of funds. Some adjustments may be necessary in several locations to step up the program in areas that are still infested with bushes and where surveys are behind schedule. These adjustments can probably be made within the region by decreasing the work load in states that are approaching a maintenance program and stepping up operations in the more troublesome areas.

It is planned to continue the rework in all areas on a schedule that will place the infested territory on maintenance in the shortest time possible. To reach this goal, it is essential that experienced personnel be assigned to the eradication program.

B. Technical Assistance

Plant pathologists, other experiment-station workers, and extension specialists provide information to farmers concerning the importance of barberry eradication. They also frequently discuss with Division personnel stem-rust development during the growing season. Likewise, area supervisors are advised of unusual developments in the uniform rust nurseries which are established in most states by the Agricultural Colleges. This information provides Division personnel with data concerning new varieties of grain and their reaction to the many races of stem rust.

Field personnel demonstrate and advise property owners and farmers on the eradication procedures and encourage them to destroy rust-spreading barberries on their own properties. County agents are supplied with informational materials and assistance in their program service activities. The county agents also assist in recruiting local workers, when temporary help is needed for short periods. The Rust Prevention Association provides information concerning the development of stem rust throughout the grain-growing areas from northern Mexico to Canada. The Rockefeller Foundation, Mexican Department of Agriculture, and the Canadian Dominion Rust Laboratory all provide data concerning severity and prevalence of rust and the occurrence of the rust races.

C. Survey

Preliminary to intensive inspections, reconnaissance surveys are made of areas to determine severity and limits of infestation. On the basis of this activity, determination is made as to type of inspection, manpower needed, and the estimated cost of operation.

In conjunction with the eradication work, annual rust surveys are made of the grain-growing areas throughout the region. These surveys are made to observe rust development and record severity and prevalence for the purpose of estimating the annual damage caused by the stem-rust disease. Rusted grain plants and infected barberry leaves are sent to the Cooperative Rust Laboratory for race determination. During the year the Laboratory identified nearly 1,500 uredial isolates and 31 isolates from aecial collections.

Damage from stem rust to small grains in 1956 was lighter than any year since 1951. Stem rust was light on spring wheat other than durum, and even the durum crop matured with rust damage only in localized areas--estimated at 2 percent in North Dakota and only traces elsewhere. Losses to oats ranged from 1 percent in Iowa to 3 percent in Ohio. Drought conditions in Texas and to the north did much to reduce this source of inoculum. Similar conditions in the North Central States--particularly in the Dakotas--limited rust development in that territory.

Since the inception of the barberry eradication program, more than 22 million bushes have been destroyed in this region. During the past 20

years there have been only 3 years in which the disease reached epidemic proportions. The damage to wheat and oats in 1953, 1954, and 1955 was largely due to race 15B of the wheat stem rust and race 7 of the oat stem rust. Records show that both of these races were first identified from rusted barberry collections.

D. Eradication

Inspection and eradication activities are designed to bring active areas to a maintenance status at the earliest possible date. This objective is reached by following a schedule of rework that will locate barberry bushes before they reach a fruiting stage. This plan of work has been practiced for a number of years, with the result that some territory is placed on maintenance each year. During fiscal year 1957, approximately 2,900 square miles were placed on maintenance and about 1,500 properties were inactivated.

The major problem, with the exception of several areas in four states, is not one of eradication but of thorough inspection. There remain some well-defined infested areas in Minnesota, Michigan, Iowa, Ohio, and Wisconsin, where the bush potential is still high. These areas will require rework one or more times. Other areas requiring attention are only lightly infested with bushes and are rapidly approaching the maintenance stage.

Scattered bushes are destroyed by applying dry chemicals (ammonium sulfamate) to the cut-off surfaces of individual canes. Where bushes are numerous, effective kills are obtained with the hormone-type chemicals (2,4-D, 2,4,5-T, and MCP) applied as a foliage- or dormant spray.

Satisfactory progress was made during the year, with intensive inspections covering 2,628 square miles. A total of 20,698 barberry bushes was destroyed on 322 new and 673 previously infested properties. Of the 676,180 square miles originally scheduled for work in the 12 states in the Central Region participating in the eradication program, 629,999 square miles are now on maintenance. Likewise, of the 4,211 previously infested properties, approximately 1,500 have been relegated to the inactive group and will not require any future scheduled inspection.

E. Regulatory

Federal Stem Rust Quarantine No. 38 provides for the control and regulating of the interstate movement of all species and varieties of barberry, mahonia, and mahoberberis plants, fruits, and seeds. Only plants of the species and varieties that have been tested for reaction to stem rust and found to be immune or highly resistant are permitted to move interstate.

Each year all nurseries and dealers who make application for permit to ship barberry and mahonia interstate are inspected. The purpose of this inspection work is to determine if applicants are complying with

the provisions of the quarantine; i.e., are growing true-to-type barberry and mahonia and propagating no rust-susceptible plants.

All states participating in the barberry eradication program have regulations parallel to the Federal Quarantine that are enforced by State inspection officials.

During the fiscal year, 476 nurseries and dealers in all states were inspected and approved to ship plants in conformance with the provisions of the quarantine. These growers had an inventory of nearly 19 million barberry and mahonia plants. Eight applications from seed growers were approved following the inspection of the stock plants.

As the Central Region is delegated the responsibility for the nursery-inspection work, this report includes the inspections made in all states.

F. Other

The principal cooperators of the barberry eradication program are: State Departments of Agriculture and Conservation, State Extension Services, State Experiment Stations, the Rust Prevention Association, State Crop Improvement Associations, and farm operators. The field operations are planned and financed jointly by the State and Federal Governments.

A total of \$388,300 of Federal funds was expended during the year. This figure represents approximately the same amount as was used during the previous fiscal year.

Certification for cash allotments made by states for the barberry eradication program amounted to \$111,787. In addition, the value of contributed services was placed at \$43,655. These services consisted of technical assistance provided by specialists, the value of greenhouse space, storage and office space, and use of equipment.

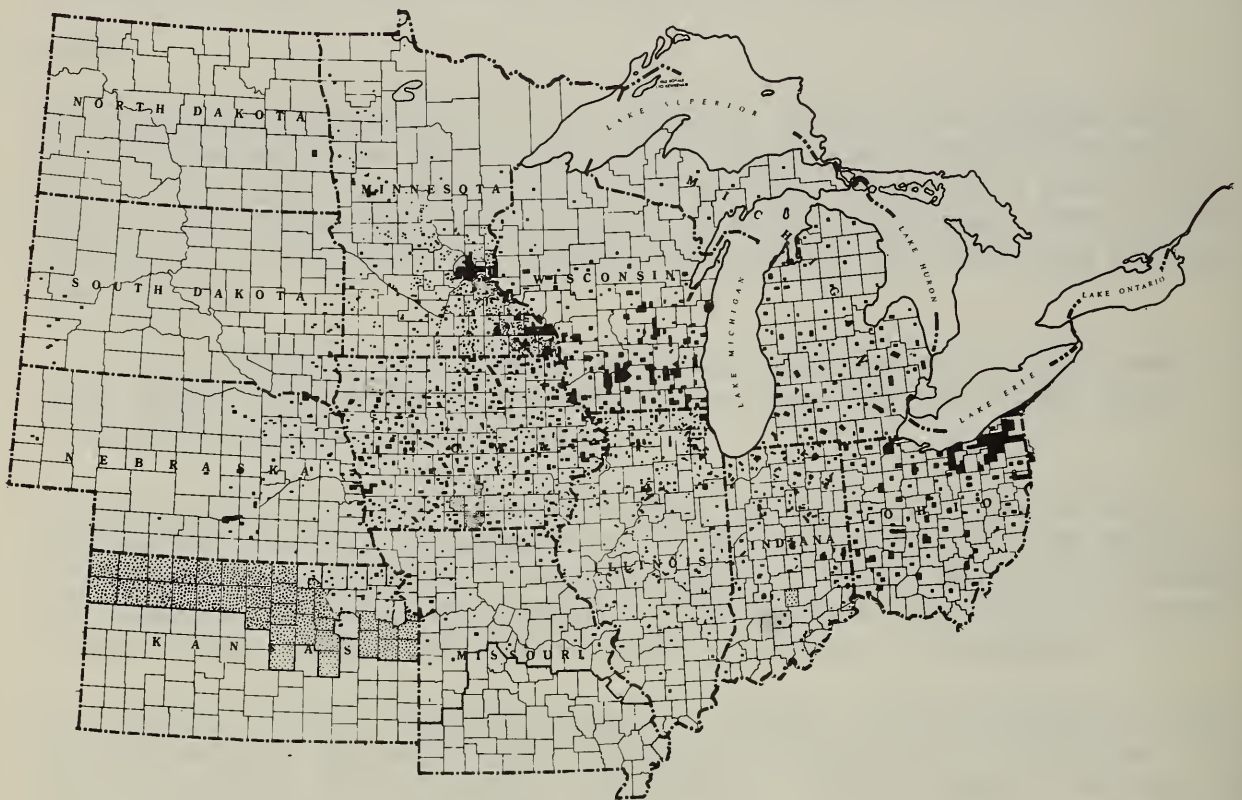
The program service and assistance to farmers for the barberry eradication program was conducted principally through the facilities of and in cooperation with Extension specialists, county agents, and the publicity divisions of the State Departments of Agriculture. The Division provided informational data and exhibit materials and assisted in disseminating them to farmers, property owners, and agricultural agencies.

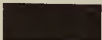
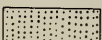
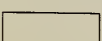
Stem-rust control was discussed informally at 101 farmer and civic group meetings, crop shows, veterans' on-the-job training classes, and college and high school agriculture and science classes. The new sound-color film, "Stem Rust--Airborne Enemy of Grain," is available at most of the agriculture film libraries in the 12 eradication states in the Central Region.

The 2 x 2 Kodachrome slides were used 3 times in connection with illustrated talks. Projectographs were used with exhibits at fairs and crop shows as part of the program service activities in a number of the states. A total of 71 news and feature stories was published and exhibits were placed at 25 fairs, farmer gatherings, and service meetings.

BARBERRY ERADICATION CENTRAL REGION

STATUS JULY 1, 1957



	Area requiring intensive work	18,526 square miles
	Area requiring farmstead work	27,655 square miles
	Area on maintenance	629,999 square miles

PRESENT STATUS, PROGRESS, AND FUTURE REQUIREMENTS, 1918-1957

State	S q u a r e M i l e s										P r o p e r t i e s										Barberry Bushes Destroyed			
	Total		Number		Covered		Number Requiring Work		One or More Times		No. Re-		Total		No. Need-		Number		Common		Native		Total	
	in	State	Initial	Inten-	Re-work	Inten-	Initial	Re-work	Initial	Re-work	quire	Future	Found	ing One or	More Rein-	to	Com-	pleted					to	Date
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)								
Illinois	56,043	56,043	34,679	4,659	7,699	0	0	0	733	55,310	20,050	2,934	17,116	2,660,221	89,781	2,750,002								
Indiana	36,045	36,045	27,329	8,404	3,409	0	299	14	248	35,484	7,011	847	6,164	199,976	211,715	411,691								
Iowa	56,167	56,167	44,441	4,002	9,785	0	992	339	5,276	49,560	15,767	5,452	10,315	1,320,100	125	1,320,225								
Kansas	32,800	6,436	0	0	0	26,364	0	0	126	6,310	149	149	0	1,287	0	1,287								
Michigan	57,481	57,481	26,637	17,096	9,783	0	0	20	1,624	55,837	19,032	5,204	13,828	6,709,322	16	6,709,338								
Minnesota	80,883	80,883	32,958	28,742	7,511	0	0	0	2,255	78,628	9,267	2,698	6,569	1,012,961	0	1,012,961								
Missouri	36,850	19,384	17,641	789	891	0	0	35	234	36,581	1,915	751	1,164	24,544	0	24,544								
Nebraska	77,268	77,268	36,832	34,966	7,019	0	0	0	570	76,698	4,929	216	4,713	148,993	0	148,993								
North Dakota	70,183	70,183	1,276	30,095	412	0	0	0	21	70,162	1,084	23	1,061	39,557	0	39,557								
Ohio	40,740	40,740	32,197	6,289	11,299	0	0	0	3,490	37,250	17,612	3,806	13,806	3,779,121	0	3,779,121								
South Dakota	76,868	76,868	12,906	4,493	1,463	0	0	0	208	76,660	1,570	83	1,487	136,437	0	136,437								
Wisconsin	54,852	54,852	21,302	23,886	10,113	0	0	0	3,333	51,519	17,951	6,710	11,241	5,716,003	0	5,716,003								
Totals	676,180	632,350	288,198	163,421	69,384	26,364	1,291	408	18,118	629,999	116,337	28,873	87,464	21,748,522	301,637	22,050,159								

Summary of Associated Activities - Fiscal Year 1957

States	Public : : Meetings : : Attended :	Talks : : Slides : : Films :	Radio : : TV :	Feature : : & News : : Stories* :	Exhibits : : tings* :	Extent These Aids Were Used** : : Bulle--: Circu--: Infested Maps : : tings* : larg* : & Posters :	Special : : Reports :
FEDERAL							
Ill.	-	-	-	-	2	100	-
Ind.	-	-	-	-	-	-	5
Iowa	2	-	-	8	-	3,200	20
Kansas	-	-	-	4	2	11,000	2
Michigan	-	-	-	1	-	3,150	-
Minnesota	-	-	-	2	2	709	-
Minneapolis	-	-	-	2	4	16	4
Missouri	-	-	-	5	1	800	21
Nebraska	-	-	-	2	1	1,000	5
North Dakota	1	-	-	-	-	-	-
Ohio	-	2	2	4	2	3,500	20
South Dakota	1	-	-	-	-	-	-
Wisconsin	-	-	-	-	-	-	-
Subtotals	4	8	33	28	2	50	200
			36	16	16	23,521	277
						1,100	1
						3,443	4
COOPERATORS							
Illinois	-	35	-	-	-	100	-
Indiana	-	12	-	-	-	-	635
Iowa	-	-	-	-	-	-	420
Kansas	-	-	-	2	-	-	1
Michigan	-	12	4	-	-	50	-
Minnesota	-	1	-	-	-	-	-
Missouri	-	-	-	-	-	-	-
Nebraska	-	9	-	-	-	-	1
North Dakota	5	4	-	4	5	500	-
Ohio	-	-	-	-	-	-	-
South Dakota	21	20	-	-	4	500	-
Wisconsin	-	-	-	37	-	-	-
Subtotals	26	93	5	43	9	1,150	1,057
GRAND TOTALS	30	101	41	71	25	24,671	277
						3,593	1,061

*Written by Federal personnel for release direct or through cooperators.

Conservative estimate. *Includes yearly newsletters for all projects.

Barberry Eradication Survey - Fiscal Year 1957

State	:Square Miles Worked:			Properties Found Infested:		Number		:Bushes Destroyed:		Inspections	
	:Initial	:Rework	:	New Props.	:Old Props.	:Inspected	:Old Props.	:Vulgaris:	:Native	:Nursery	:Dealer
Illinois	0	78		12	17	74		202	0	30	6
Indiana	0	40		3	18	191		759	0	10	0
Iowa	57	1,225		56	71	747		503	0	7	3
Kansas	2,726	0		40	3	16		173	0	6	0
Kentucky	0	0		0	0	0		0	0	7	0
Michigan	0	265		99	221	856		9,869	0	22	3
Minnesota	0	160		29	49	301		1,246	0	21	9
Missouri	215	30		3	3	56		19	0	8	5
Nebraska	0	192		5	2	228		15	0	2	0
North Dakota	0	3		0	0	0		2	0	1	2
Ohio	0	531		32	119	1,101		5,538	0	72	0
South Dakota	0	3		0	2	0		2	0	1	0
Wisconsin	39	391		43	168	641		2,370	0	8	2
Totals	3,037	2,918		322	673	4,211		20,698	0	195	30

Cooperative Aid Received - Fiscal Year 1957

State	Cash and Equivalent Aid*					Total of :			Intangible :			Source
	: Personal : Equipment :					: Cash & :			: Service :			
	Cash	Services	:& Supplies:	Space		: Equiv.*	:	Estimate**	:	Total		
Illinois	\$ 3,604	\$ 0	\$ 0	\$ 0		\$ 3,604		\$ 4,025		\$ 7,629		
Indiana	6,403	0	0	0		6,403		2,000		8,403		
Iowa	4,582	0	0	2,400		6,982		5,700		12,682		
Kansas	4,797	0	0	0		4,797		2,000		6,797		
Michigan	14,569	9,983	5	1,200		25,757		4,500		30,257		
Minnesota	15,474	200	0	1,127		16,801		7,300		24,101		
Missouri	3,060	0	0	50		3,110		2,940		6,050		
Nebraska	5,267	0	0	720		5,987		2,000		7,987		
North Dakota	2,725	0	0	360		3,085		1,350		4,435		
Ohio	15,251	0	0	232		15,483		5,580		21,063		
South Dakota	5,000	60	0	0		5,060		2,360		7,420		
Wisconsin	13,153	0	365	1,200		14,718		3,900		18,618		
Totals	93,885	10,243	370	7,289		111,787		43,655		155,442***		

*Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

**Limited to services incidental to other activities for which only an estimated value is available.

***Does not include contributed services, Cooperative Rust Laboratory, valued at \$4,200, and Rust Prevention Association, \$34,000.

State	: Planning & : Technical : Survey : Control : Regulatory : Methods : Other : Total						
: Direction : Assistance :	: Improvement :						
CASH & EQUIVALENT*							
PPC Division	\$37,000	\$ 9,300	\$33,200	\$272,800	\$26,000	\$2,500	\$388,300
Other Organizations:							
Ill.	500	3,104	0	0	0	0	3,604
Ind.	0	0	6,403	0	0	0	6,403
Iowa	0	0	0	4,582	0	0	6,982
Kans.	0	0	0	4,797	0	0	4,797
Mich.	0	0	0	24,552	0	0	25,757
Minn.	0	0	0	15,674	0	0	16,801
Mo.	0	0	0	3,060	0	0	3,110
Nebr.	0	0	0	5,267	0	0	5,987
N. Dak.	450	1,000	975	300	0	0	3,085
Ohio	0	0	0	15,251	0	0	15,483
S. Dak.	0	4,150	360	550	0	0	5,060
Wis.	0	0	0	13,153	0	0	14,718
Subtotals	950	8,254	7,738	87,186	0	0	111,787
CONTRIBUTED SERVICES**							
Ill.	0	4,025	0	0	0	0	4,025
Ind.	0	2,000	0	0	0	0	2,000
Iowa	100	4,000	500	0	1,100	0	5,700
Kans.	100	1,200	200	0	500	0	2,000
Mich.	300	1,300	200	0	2,700	0	4,500
Minn.	200	800	0	3,800	2,300	0	7,300
Mo.	100	1,200	0	0	1,400	0	2,940
Nebr.	100	1,200	200	0	500	0	2,000
N. Dak.	0	750	0	0	600	0	1,350
Ohio	400	1,850	400	530	2,400	0	5,580
S. Dak.	100	1,760	0	0	500	0	2,360
Wis.	400	900	100	0	2,500	0	3,900
Subtotals	1,800	20,985	1,600	4,330	14,500	0	43,655***
GRAND TOTALS	\$39,750	\$38,539	\$42,538	\$364,316	\$40,500	\$2,500	\$543,742

*Direct approp., allotments other sources, services & supplies for which there is actual cash expenditure.

**Services incidental to other activities, for which only an estimated value is available.

***Does not include contributed services Cooperative Rust Laboratory, valued at \$4,200, and Rust Prevention Association, \$34,000.

Revised
(* - - *)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
EASTERN REGION

ANNUAL PROGRAM REPORT

EARBERRY ERADICATION

July 1, 1956 - June 30, 1957

COOPERATING AGENCIES:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
In cooperation with
State, County, and Local Agencies

December 1957
Moorestown, New Jersey

H. L. Smith
Regional Supervisor

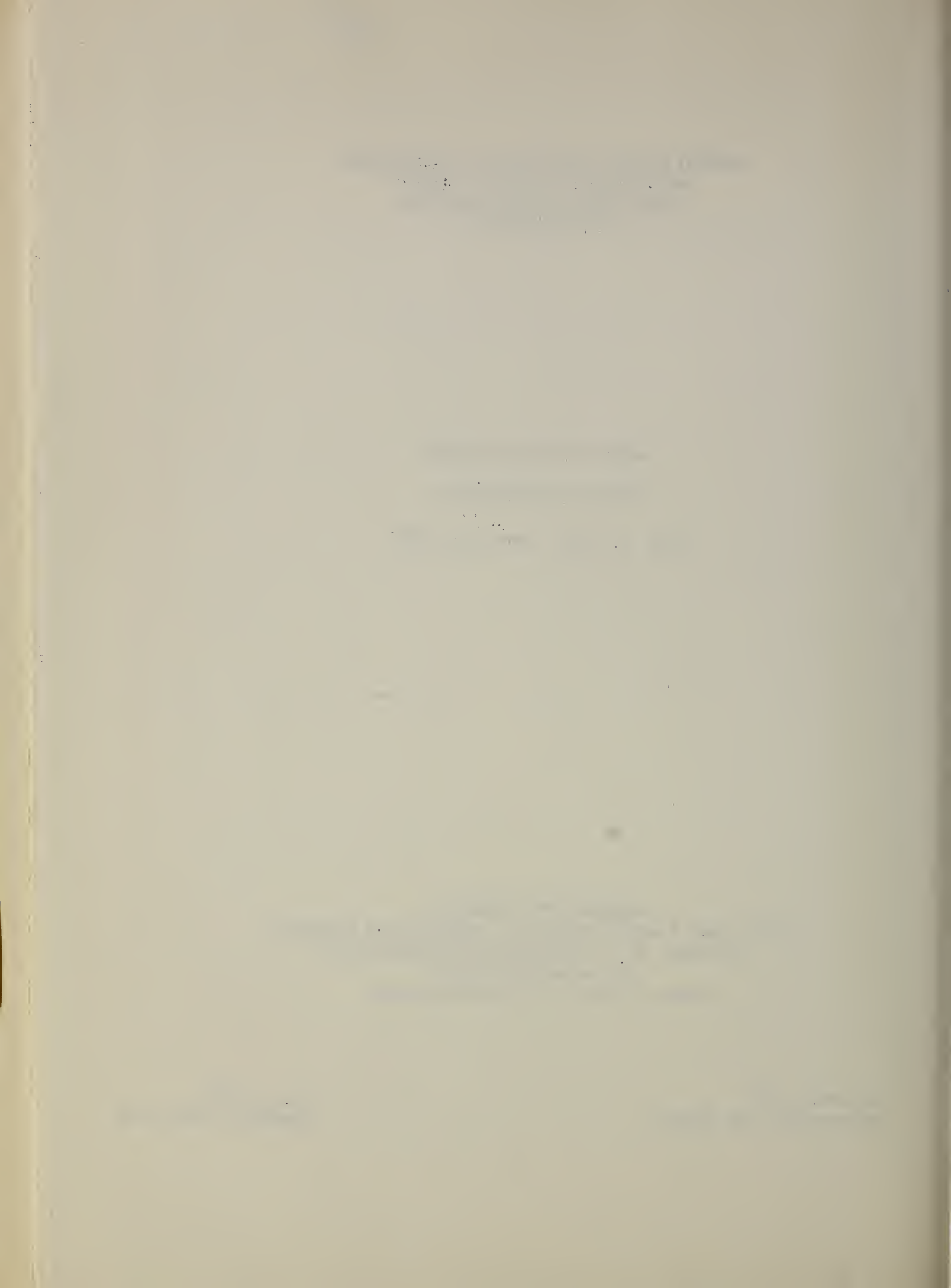
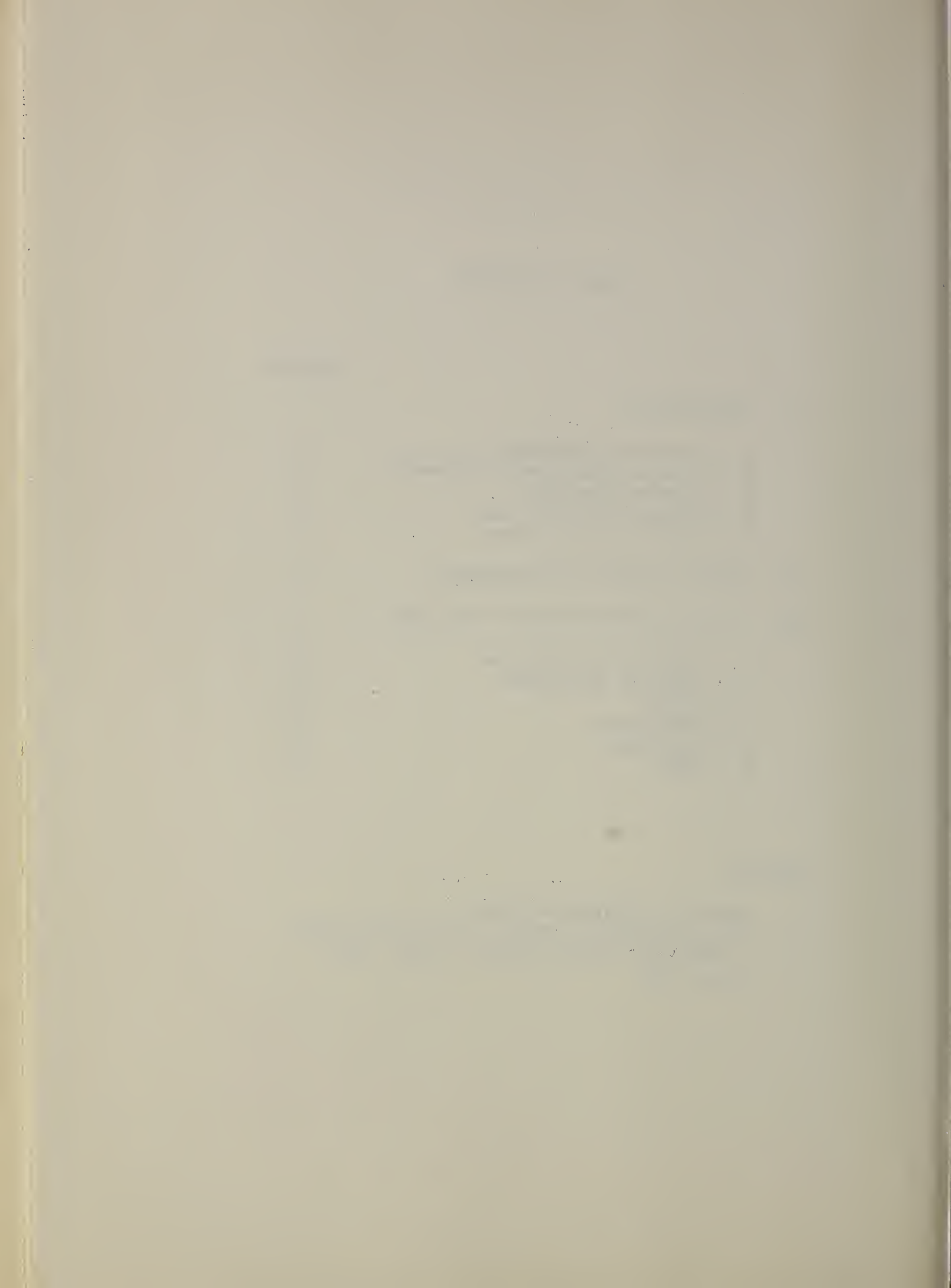


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Appendix

Barberry Eradication Survey
 Total Properties Cleared and Barberry Bushes
 Destroyed, Entire Program, 1934 - 1957
 Status Map



I. INTRODUCTORY

A. Statement of Problem

Rust-infected barberry bushes are an important early source of the stem rust that attacks wheat, oats, barley, and rye. The disease develops on the barberry early each spring and spreads to small grains and grasses, each year causing serious crop damage and often over a wide area before harvest. The sexual stage of the rust occurs on the barberry, and it is in this stage that new and occasionally virulent races of the rust fungus are produced. Some of these races attack varieties of grain heretofore considered resistant to stem rust. The barberry-eradication program therefore serves two purposes: (1) eliminates the early source of infection, thus controlling local epidemics; (2) destroys the breeding place of new races of the rust.

Three states of the Eastern Region--Pennsylvania, Virginia, and West Virginia--are engaged in the cooperative barberry-eradication program for the control of stem rust. The 3 eradication states comprise an area of over 109,226 square miles, with millions of farms and city properties. Barberry bushes are found by systematic foot-scouting of all territory. Areas where fruiting bushes are destroyed are reworked periodically until no new bushes are found.

B. Program Justification Statement

Rust-susceptible grain crops constitute an important source of farm income in the Eastern Region. More than two billion bushels of wheat, oats, barley, and rye are grown on 70 million acres of the best cropland in the United States. These crops have annual valuation of approximately two billion dollars. Stem rust is potentially the most destructive disease of these crops. Some losses occur every year, and during epidemic years, many farmers have had their entire crop wiped out.

C. Program Objective

The program objective is to maintain the barberry-free condition that has been attained, to rework infested areas until there is no more regrowth, and to complete initial work. This is accomplished through informational activities, studies of seasonal rust development, quarantine enforcement, and periodic inspection of previously infested locations.

D. Changes from Work Plan

Insofar as practicable, there was no change from the work plan.

E. Status of Infestation

Originally 42,993 square miles were scheduled for work in the 3 states of the Eastern Region participating in the eradication work. These 3 states have many troublesome areas with high bush potential. These areas involve some of the most rugged terrain, where barberries have had many years in which to become established, and, because of the heavy seeding, will persist to be a control problem. Rework in these areas will be conducted on a schedule that will eliminate any new bushes before they begin to produce seed. Remaining initial work will be done as rapidly as possible.

II. PROGRAM HISTORICAL INFORMATION

The common, or European, barberry was introduced into this country by the early colonists and became widespread through the important grain-growing areas in the United States. There also are two native species—Berberis fendleri, found in Colorado, and B. canadensis, in the Virginias. Only small local infestations of the native species have been found in Illinois, Indiana, Iowa, and Pennsylvania. Even before the Revolutionary War, farmers observed that stem rust was spread by the barberry to grain fields, and laws were passed condemning the pest. However, it was not until 1865 that scientists discovered the direct relationship between the barberry and the rust of small grains. The practical importance of this was overlooked for many years, and not until 1918, after the barberry had become widely distributed and had caused serious damage, was an eradication program started.

The stem-rust fungus is not a simple species, but consists of a large number of strains or races which differ in their ability to attack different varieties of grain. The complex nature of the fungus has greatly increased the work of plant breeders in their attempt to develop varieties resistant to stem rust. The eradication of barberry bushes became of even greater importance when, in the late twenties, science discovered that two existing races can hybridize on the barberry, thus producing new races, some of which may attack varieties of grain that previously were highly resistant to the disease.

Originally, thirteen states in cooperation with the Federal Government inaugurated an active eradication program. Presently the area comprises nineteen important grain-producing states. Barberries were originally introduced into Eastern United States and became well established. Three important small grain-producing states in the Eastern Region are conducting an eradication program.

During the early years of the barberry-eradication program, many problems were encountered. The most urgent of these was the need for an effective and economical method of eradication. Grubbing and digging were not satisfactory because abundant regrowth developed from root fragments left in the soil. In order to find an effective chemical

that would kill the barberry, tests were made in the early twenties with numerous chemicals, resulting in the use of salt or kerosene. Following many more tests, ammonium sulfamate was adopted for field use by applying the chemical to cut surfaces of the barberry canes. This method is very effective for treating isolated bushes. In areas of heavy bush concentration, a chemical formulation of 2 parts 2, 4-D and 1 part 2, 4, 5-T plus pentachlorophenol, applied as a basal spray and ground drench, is highly effective. The use of these new chemicals has eliminated the burdensome job of trucking and back-packing large quantities of salt, and has resulted in a substantial reduction in operational costs.

Through the persistent efforts of the U. S. Department of Agriculture the State Departments of Agriculture, and other cooperating agencies, there remain only 12,836 of the 42,993 square miles originally scheduled for work in the Eastern Plant Pest Control Region. This infested area will require one or more inspections before it can be placed in the maintenance category.

The enforcement of Quarantine 38 has done much to preclude the reinfestation of areas cleared of susceptible barberry. These regulations govern the interstate movement of all barberry and mahonia plants and seeds. The quarantine provisions are so designed as to prohibit the movement into the eradication states of any barberry and mahonia plants that have not been inspected and found to be rust-resistant species.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

Field activities for the barberry-eradication project were conducted in accordance with previously accepted plans jointly agreed upon by the area supervisor and the state officials responsible for this Plant Pest Control program. The area supervisor takes the lead in directing the over-all phases of the comprehensive stem-rust-control work in his assigned area, with frequent consultations with officials of the cooperating agencies.

Most of the planned work this year was completed on schedule. In order to accomplish the long range program in Pennsylvania and the Virginias, it will be necessary to continue to allot a larger percentage of Barberry Eradication funds to the Eastern Region. It is here that the major rework problem persists and initial work has not been completed.

It is planned to continue the rework in all areas on a schedule that will place the infested territory on maintenance in the shortest time possible. To reach this goal, it is essential that experienced personnel be assigned to the eradication program.

B. Technical Assistance

Plant pathologists, other experiment-station workers, and extension specialists provide information to farmers concerning the importance of barberry eradication. They also frequently discuss with Division personnel stem-rust development during the growing season. Likewise, area supervisors are advised of unusual developments in the uniform rust nurseries which are established in most states by the Agricultural Colleges. This information provides Division personnel with data concerning new varieties of grain and their reaction to the many races of stem rust.

Field personnel advise property owners and farmers and demonstrate proper eradication procedures. They also encourage them to destroy rust-spreading barberries on their own properties. County agents are supplied with informational materials and assistance in their program service activities. The county agents also assist in recruiting local workers, when temporary help is needed for short periods. The Rust Prevention Association provides information concerning the development of stem rust throughout the grain-growing areas from northern Mexico to Canada. The Rockefeller Foundation, Mexican Department of Agriculture, and the Canadian Dominion Rust Laboratory all provide data concerning severity and prevalence of rust and the occurrence of the rust races.

C. Survey

Preliminary to intensive inspections, reconnaissance surveys are made of areas to determine severity and limits of infestation. On the basis of this activity, determination is made as to type of inspection, manpower needed, and the estimated cost of operation.

In conjunction with the eradication work, annual rust surveys are made of the grain-growing areas throughout the region. These surveys are made to observe rust development and record severity and prevalence for the purpose of estimating the annual damage caused by the stem-rust disease. Rusted grain plants and infected barberry leaves are sent to the Cooperative Rust Laboratory for race determination. During the year, the Laboratory identified nearly 1,500 uredial isolates and 31 isolates from aecial collections from the United States.

Observations for stem rust damage indicated that barberry eradication was giving good control of the disease and losses in 1956 continued at a low level. However, severe damage did occur in areas where barberries are still closely associated with grain fields, where there was early development of initial infection. Losses to stem rust in 1956 in the Barberry Eradication States, Eastern Region are estimated as follows:

	<u>Wheat</u>	<u>Oats</u>	<u>Barley</u>	<u>Rye</u>
Pennsylvania	Trace	Trace	0	0
Virginia	2.5%	1	Trace	Trace
West Virginia	1.5%	1	Trace	Trace

Losses to stem rust in Pennsylvania and the Virginias in recent years have been stabilized and now average less than 3% for wheat, 1% for oats, and only a trace for barley and rye. This is in contrast to losses which have been as large as 12% of the small grain crop before control efforts became effective.

Results of studies made by the Federal Rust Laboratory, of collections submitted from eradication states in the Eastern Region, show that the number of new rust races occurring in those areas is decreasing as the barberry population decreases. However, barberries remaining in the Eastern Region, particularly outside of the eradication states, are an important source of new and virulent rust races which may threaten the nations small grains.

D. Eradication

Inspection and eradication activities are designed to bring active areas to a maintenance status at the earliest possible date. This objective is reached by completing initial work following a schedule of rework that will locate barberry bushes before they reach a fruiting stage. This plan of work has been practiced for a number of years, with the result that some territory is placed on maintenance each year. During fiscal year 1957, approximately 991 square miles were placed on maintenance and about 201 properties were inactivated.

The major problem remaining in the eradication state varies by the species of barberry involved. In Pennsylvania, all known heavily infested B. vulgaris areas have been worked and reworked to a point where the number of bushes now being found is relatively small compared with infestation found on initial coverage. Consequently, use of hormone type herbicides effectively used in areas with high bush population is decreasing and Ammate is being used for eradication of remaining scattered bushes. The initial work still to be done consists, for the most part, of property site inspection and the eradication is not expected to be difficult.

In the Virginias, the major problem in the native barberry B. canadensis area continues to be one of eradication in initial as well as rework territory. This work requires large amounts of hormone type herbicides. The initial survey of B. vulgaris areas of West Virginia has been completed and requirements for this type of survey in Virginia is now confined to parts of eight counties.

Satisfactory progress was made during the year, with intensive inspections covering 849 square miles. A total of 5,655,291 barberry bushes was destroyed, 81,924 of which were B. vulgaris.

on 344 new and 1554 previously infested properties. Likewise, of the 3134 previously infested properties, 201 were relegated to the inactive group and will not require any future scheduled inspection. Of the 42,993 square miles originally scheduled for work in the 3 states in the Eastern Region participating in the eradication program, 30,157 square miles are now on maintenance.

E. Regulatory

Federal Stem Rust Quarantine No. 38 provides for the control and regulating of the interstate movement of all species and varieties of barberry, mahonia and mahoberberis plants, fruits, and seeds. Only plants of the species and varieties that have been tested for reaction to stem rust and found to be immune or highly resistant are permitted to move interstate.

Each year all nurseries and dealers who make application for permit to ship barberry and mahonia interstate are inspected. The purpose of this inspection work is to determine if applicants are complying with the provisions of the quarantine; i.e., are growing true-to-type barberry and mahonia and propagating no rust-susceptible plants.

All states participating in the barberry eradication program have regulations parallel to the Federal Quarantine that are enforced by state inspection officials.

F. Other

The principal cooperators of the barberry eradication program are: State Departments of Agriculture, State Extension Services, State Experiment Stations, County Commissioners, the Rust Prevention Association, State Crop Improvement Associations, and farm operators.

Stem-rust control was discussed informally at 76 farmer and civic group meetings, crop shows, veterans' on-the-job training classes, and college and high school agriculture and science classes. A total of 7 news and feature stories was published and exhibits were placed at 8 fairs, farmer gatherings and service meetings. A total of 4,391 items of program information was forwarded on request to schools and others.

Miscellaneous publication No. 54, entitled "Stem Rust Destroys Our Grain" was prepared cooperatively by the Agricultural Extension Service and Experiment Station, West Virginia University and the Plant Pest Control Division, U. S. Department of Agriculture. Ten thousand copies were printed for distribution throughout the State through County Agents and the State Department of Agriculture.

BARBERRY ERADICATION - SURVEY - FISCAL YEAR - 1957

EASTERN REGION

State	Sq. Mi. Worked		Properties Found Infested		Number Old Prop. Inspected	Bushes Destroyed		Inspections	
	Initial	Rework	New Prop.	Old Prop.		Vulgaris	Native	Nursery	Dealer
Pennsylvania	947	557	296	1988	865	81,700	0	21	4
Virginia	33	296	43	558	933	17	4,706,667	16	1
W. Virginia	70	86	5	131	173	217	866,700	3	0
Total	1,050	939	344	2,677	1,971	81,934	5,573,367	40	5



TOTAL PROPERTIES CLEARED AND BARBERRY BUSHES DESTROYED, ENTIRE PROGRAM, 1934-1957

States	PROPERTIES							BARBERRY BUSHES DESTROYED				Grand Total All Barberries Destroyed (11)
	New Properties			Old Properties				New Properties		Old Props.		
	Total Cleared of Bushes and Seed- lings (2)	Number Having Escaped Bushes & Seedlings (3)	Number Having Fruit- ing Bushes (4)	Total No. of Re- inspec- tions (5)	Total Cleared Of Bushes and Seed- lings (6)	Number Having Fruit- ing Bushes (7)	Total Bushes and Seed- lings (8)	Number of Escaped Bushes and Seedlings (9)	Total Bushes and Seedlings (10)			
Pennsylvania	11,853	8,901	4,168	20,985	10,557	6,847	12,310,949	12,085,864	2,979,737	15,290,686		
Virginia	4,940	4,772	2,011	7,668	3,542	3,429	175,289,908	173,810,632	45,447,991	220,737,899		
West Virginia	2,241	2,191	497	2,281	1,377	1,242	165,306,616	164,895,749	14,162,767	179,469,383		
Totals	19,034	15,864	6,676	30,934	15,476	11,518	352,907,473	350,792,245	62,590,495	415,497,968		

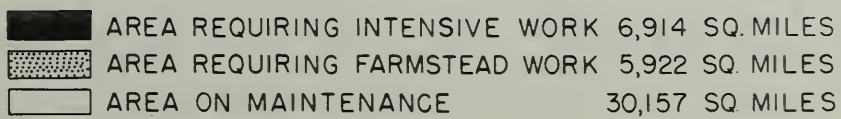
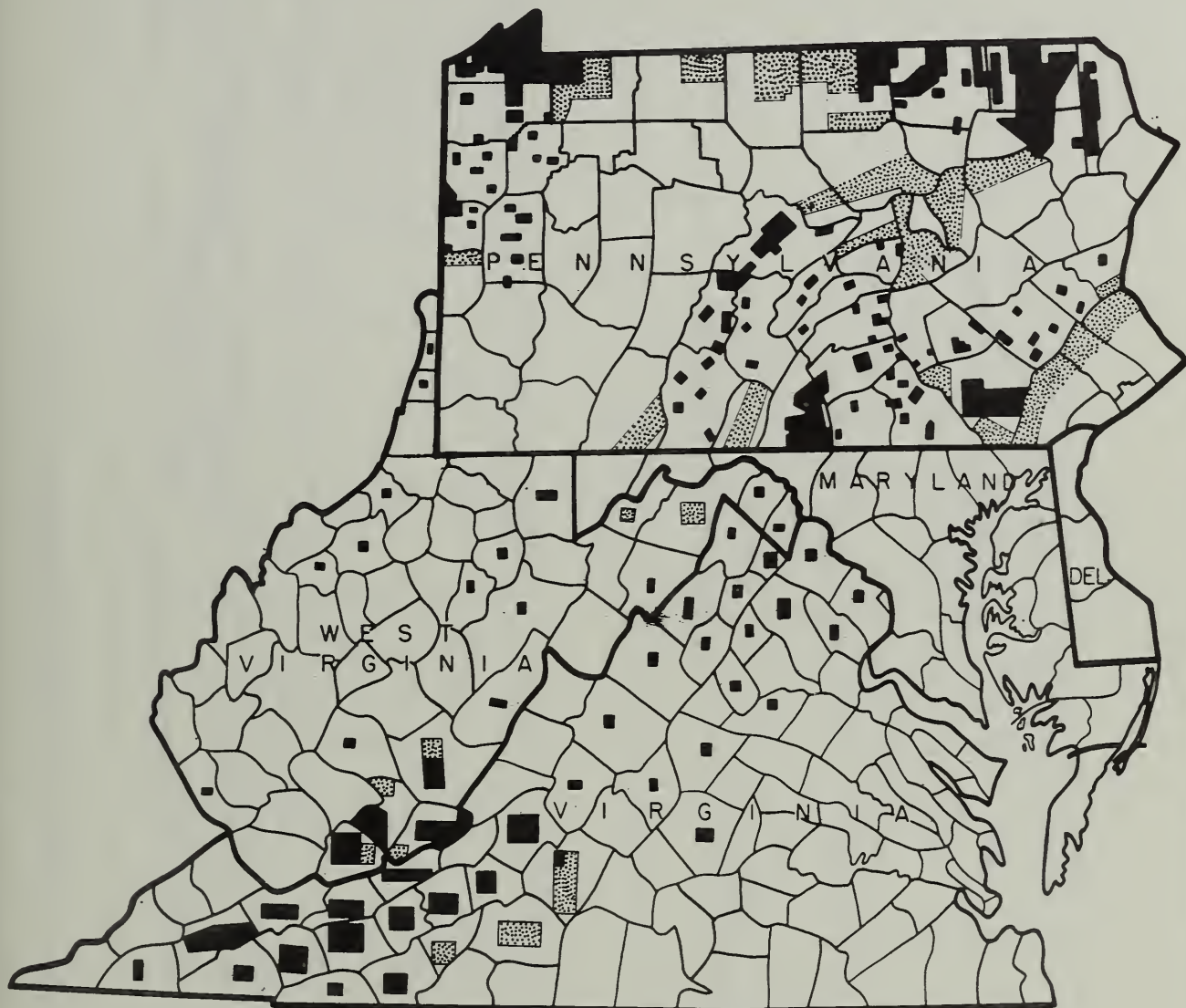
SUMMARY OF ASSOCIATED ACTIVITIES - FISCAL YEAR 1957

States	Public Meetings Attended	P r e s e n t a t i o n s					Feature & News Stories	Extent These Aids Were Used				Special Reports
		Talks	Slides	Films	Radio	TV		Exhibits	Bul.	Cir.	Infest. Maps & Posters	
Pennsylvania		3	3	4	-	-	2	7	810	740	34	70
Virginia		52	-	52	-	-	-	1	116	1246	51	-
West Virginia		21	-	21	-	-	1	-	52	280	21	-
Totals		76	3	77	-	-	3	8	978	2266	106	70



BARBERRY ERADICATION EASTERN REGION

STATUS JULY 1, 1957





PRESENT STATUS, PROGRESS, AND FUTURE REQUIREMENTS, 1934-1957

State	S Q U A R E M I L E S										No. Re- quiring No Future Work
	Total in State to be Worked (2)	Number Covered				Number Requiring Work One or More Times					
		Initial Work		Rework		Farmstead		Intensive			
		Farm- stead (3)	Inten- sive (4)	Farm- stead (5)	Inten- sive (6)	Initial	Rework	Initial	Rework		
		(1)									
Pennsylvania	24,780	9,801	9,944	0	5,823	4,965	0	70	4,218	15,527	
Virginia	12,532	7,893	3,135	10	3,634	664	0	840	1,222	9,806	
W. Virginia	<u>5,681</u>	<u>3,350</u>	<u>2,037</u>	<u>143</u>	<u>1,722</u>	<u>179</u>	<u>114</u>	<u>115</u>	<u>449</u>	<u>4,824</u>	
Totals	42,993	21,044	15,116	153	11,179	5,808	114	1,025	5,689	30,157	

Cont'd

State	p r o p e r t i e s				Barberry Bushes Destroyed			
	Total Found to Date (12)	No. Needing One or More Rein-inspections (13)	Number Completed (14)	Common (15)	Native (16)	Total To (17)		
(1)								
Pennsylvania	11,853	11,199	783	15,290,079	607	15,290,686		
Virginia	4,940	3,985	955	23,797	220,714,102	220,737,899		
W. Virginia	<u>2,241</u>	<u>2,100</u>	<u>141</u>	<u>22,636</u>	<u>179,446,747</u>	<u>179,469,383</u>		
Totals	19,034	17,284	1,879	15,336,512	400,161,456	415,497,968		

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BARBERRY ERADICATION

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PROGRAM ANNUAL REPORT

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**UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION**



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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION

ANNUAL PROGRAM REPORT

BARBERRY ERADICATION

July 1, 1956 - June 30, 1957

Cooperating Agencies:

State Departments of Agriculture
State College Experiment Stations
and Extension Services
Counties and Individuals
in States of:
Colorado
Montana
Washington
Wyoming

October 30, 1957
Oakland, California

Jim R. Dutton
Regional Supervisor



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INTRODUCTORY

Statement of Problem

The Federal-State cooperative program for the eradication of barberry bushes is for protection against the stem rust disease of wheat, oats, barley, and rye. Of the 11 States comprising the Western Region of the Plant Pest Control Division, only Colorado, Montana, Washington, and Wyoming are joined cooperatively with the Federal Government in active eradication programs. However, in Idaho and Oregon, employees of the Division make annual trips with State personnel to investigate general stem rust conditions, collect specimens for the Federal Rust Laboratory, and locate and observe rust spreads from barberry bushes. Other States of the Western Region cooperate mainly with the nursery inspection part of the program.

Total small grain production in Colorado, Montana, Washington, and Wyoming, based on the 10-year average, is 279,684,000 bushels annually, valued at \$494,437,000.00. In these States, an organized Federal-State cooperative program of systematic survey is conducted with trained personnel to locate and destroy rust-susceptible barberry in rural and urban areas. Periodic reinspections are necessary at locations where the bushes are found and until there is no further danger of new growth from seed in the soil.

The barberry eradication program in the cooperating States is a long-range project necessitating the continuity of adequate and properly spaced surveys aimed at the eventual elimination of the bushes from grain-producing areas. In Wyoming this largely has been attained, and the current problem involves reinspection of a very few old barberry sites. For Montana the program is larger but has been reduced to an entirely State-financed program, with Federal coordination, principally conducted during the summer season. Maintenance control largely has been attained and the problem for the current year was routine reinspection of old individual barberry locations and in former sizeable escape areas. The main problem in Colorado continued to be in the southwestern portion of the State. Spraying operations with herbicides were conducted there in counties where barberries native to this territory are gradually being eliminated. Some maintenance reinspection was done at old barberry sites in eastern Colorado. In Washington, where a State-Federal program was not begun until 1944, initial surveys were completed this year in the last counties scheduled for this work. The main problem for 1957 was the first and second rework surveys for control of the

recurring infestations in eastern counties which were initially surveyed in the first years of the work.

Program Justification Statement

Small grain production is vital to the economy of the United States and the crops generally are the farmers' most important source of cash income. While stem rust damage varies from year to year, during some past epidemic years the crop losses have been disastrous. The eradication of barberry and the growing of rust-resistant grain varieties have both contributed in a reduction by 50 percent in the average losses in the 19 eradication States. The stem rust control being attained through barberry eradication protects crops from local and regional outbreaks of the disease, affords long-range stabilization of grain varieties and production, and insures the farmers' cash crops of wheat, oats, barley, and rye from the large losses that may be caused by the rust developing on these bushes.

Program Objective

The stem rust disease develops every spring on the leaves of susceptible barberry bushes and spreads early in the growing season to wheat, oats, barley and rye, and to wild grasses. From these early local sources the rust increases and spores of the disease are carried by the wind over an ever-widening area. Often the local spreads merge and create epidemics that damage crops throughout entire regions. New rust races are produced on barberry that can attack grain varieties previously resistant to the disease. The objective of the barberry program is to eradicate these bushes from grain areas in the cooperating States and, by the systematic reworking of infested properties, gradually eliminate the sites as continuing future problems, thereby establishing effective control that requires minimum maintenance activity. The eradication program serves two principal purposes: (1) it destroys the early barberry sources of stem rust infection, and (2) eliminates the breeding place for new stem rust races.

Changes from Work Plans

The work done during the 1957 fiscal year in Colorado, Montana, Washington, and Wyoming followed the plans outlined

for the period. Work done was in accordance with the long-range schedules for reinspection of infestation sites at regular intervals aiming at the achievement of maintenance control.

Status of Infestation

The four barberry eradication States of the Western Region comprise a control area of 345,360 square miles. All of this, except 100 square miles of pending initial intensive territory in Washington, has been initially surveyed and 30,771 square miles have been reworked one or more times. Rework is required in only 1,324 square miles; however, this represents the sum of the most difficult territory and will require the slow, intensive method of survey. Many of the remaining active properties involved will require two or more reinspections over a considerable period of time to attain control. There are now 343,936 square miles in these States from which barberry bushes are believed to have been eradicated. This control is being maintained through program service activities, observation of rust spreads for possible local barberry sources, State and Federal quarantine enforcement, and nursery inspection, and by surveillance of old infested barberry locations.

In the four States a total of 74,352,418 barberry bushes have been destroyed on 15,287 properties since the eradication programs were started. Of the individual properties involved, 3,328 are now in an inactive status and where additional bushes are not likely to occur. On the remaining 11,959 properties, reinspections are necessary until there is no longer danger of new bushes arising from seed in the soil. Each year additional properties are inactivated and square miles of area retired which will continue until all presently infested territory is placed in maintenance status. Following this a continuing type of program with a small force will be required to maintain the control that has been established.

PROGRAM HISTORICAL INFORMATION

The campaign to control stem rust of small grains through the eradication of the alternate hosts, rust-susceptible species of barberry, has been in progress since 1918 in Colorado, Montana,

Wyoming, and the 10 central States comprising the original 13-State control area. The project was initiated after the nation had been aroused by the stem rust epidemic of 1916 which caused a loss of wheat estimated at over 200 million bushels valued at \$283,600,000. The State of Washington joined in the program in 1944 following a series of heavy rust-loss years beginning in the 1930's and culminating in a crop loss in 1943 of an estimated value of \$500,000. Nineteen northern States now are actively co-operating with the Plant Pest Control Division in the project for barberry eradication.

Common barberry bushes (B. vulgaris) were brought from Europe by America's earliest settlers. By 1700 grain was being seriously damaged near barberry and before the Revolutionary War, Connecticut, Rhode Island, and Massachusetts enacted the earliest U. S. legislation requiring their eradication. The bushes were introduced into the States of the eradication area as ornamental shrubs and were propagated and extensively distributed by nurseries. At the beginning of the eradication campaign in 1918, the plants were found not only as cultivated ornamentals, but also were growing in enormous numbers as escaped bushes in wild areas. Likewise, two principal native wild species of barberry were found to be very rust-susceptible; namely, the eastern B. canadensis, mainly in the Virginias, and B. fendleri in southwestern Colorado. Most of the planted bushes in the control area of the eradication States now have been removed. Throughout the years, millions of the shrubs have been destroyed in the wild areas of native and escaped common barberry. However, many of these areas still are producing new barberry from seed in the soil and constitute the principal problem at the present time.

PROGRAM ACTIVITY DURING FISCAL YEAR

Planning and Direction

Procedure

Personnel of the Plant Pest Control Division in the four Western Regional barberry eradication States co-ordinate all of the activities of the project, handle field direction of survey and eradication, work with State inspectors on nursery inspection, with special attention to interstate barberry shipments, conduct seasonal stem rust surveys, engage in field tests of herbicides, and develop other direct field operation

for the period. Work done was in accordance with the long-range schedules for reinspection of infestation sites at regular intervals aiming at the achievement of maintenance control.

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PROGRAM HISTORICAL INFORMATION

The campaign to control stem rust of small grains through the eradication of the alternate hosts, rust-susceptible species of barberry, has been in progress since 1918 in Colorado, Montana,

Wyoming, and the 10 central States comprising the original 13-State control area. The project was initiated after the nation had been aroused by the stem rust epidemic of 1916 which caused a loss of wheat estimated at over 200 million bushels valued at \$283,600,000. The State of Washington joined in the program in 1944 following a series of heavy rust-loss years beginning in the 1930's and culminating in a crop loss in 1943 of an estimated value of \$500,000. Nineteen northern States now are actively co-operating with the Plant Pest Control Division in the project for barberry eradication.

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PROGRAM ACTIVITY DURING FISCAL YEAR

Planning and Direction

Procedure

Personnel of the Plant Pest Control Division in the four Western Regional barberry eradication States co-ordinate all of the activities of the project, handle field direction of survey and eradication, work with State inspectors on nursery inspection, with special attention to interstate barberry shipments, conduct seasonal stem rust surveys, engage in field tests of herbicides, and develop other direct field operation

phases of the program. Work plans for barberry activities in the various States are prepared in collaboration with the State Departments of Agriculture and other principal cooperators.

The planning of project field activities is based on procedures and operations that have been effective for a number of years. Barberry location records and maps are comprehensive and, based on the necessity for periodic property reinspections, there are general long-range plans in each of the States covering work requirements for several years ahead. Yearly and seasonal readjustment of planning is done in accordance with current work progress and availability of funds. Broad policy for over-all planning and direction originates at the Regional level, and the Supervisors develop this policy to fit the particular situations for the Areas and Districts. The general policy is that survey work is conducted only in areas that normally support barberry growth. The long-range and yearly plans are developed entirely on the need for survey, predicated on the territory meeting the ecological requirements for the shrub, the known presence of the bushes in the area, and on the basic reinspection interval judged proper for the area. At the field level, property records for various localities are constantly being reviewed and reconnaissance is conducted in advance at proposed future work sites so that survey will be done at the proper time to insure maximum control.

Recommendations

The program has operated satisfactorily in the four western barberry eradication States during the 1957 fiscal year and no specific recommendations for changes in field operations appear necessary. However, as a result of the reorganization of the Plant Pest Control Division, the duties of Area Supervisors in the States are so diversified that the close attention given to barberry work when operated as a separate project is no longer feasible. During the period of adjustment care should be exercised that cooperators continue to be regularly contacted and adequately informed of activities and progress, that program informational service work is sustained, and that field planning and personnel are adequately supervised to maintain good performance and results.

Attention should continue to be given to the States assuming the major financing of barberry programs where maintenance status mainly has been achieved, or entire costs in areas where maintenance status is established and barberry infestation or reinfestation is a minor problem. The Federal Government should aid in coordinating and directing the programs and supplying information concerning the respective Federal and State responsibilities.

Technical Assistance

Received from Cooperators

Technical assistance received from State, State College, Experiment Station, and Extension sources principally consists of direct work with the public such as initial identification of barberry, inspection of rusted fields, submission of stem rust specimens, consultation on special local barberry, rust, and survey situations, and related matters. Also, these agencies supply various types of technical information as required, collaborate in the preparation of pamphlets, news articles, and similar program service items, and in general serve in a consultative and advisory capacity for the various program activities.

Rendered by Program Personnel

Systematic barberry survey and eradication work in infested territory is handled almost entirely by program personnel. However, property owners are encouraged to keep down infestations and all assistance possible is given in furthering this endeavor. Barberry and rusted grain specimens submitted by college, Extension, State personnel, and farmers, and others are identified, and a general flow of information on this and other project activities is maintained through the cooperators to the public. The Area offices in the four States also are called upon regularly to supply information from their files to the colleges, Extension, and other cooperating agencies relative to barberry and stem rust and to provide general leadership for the program.

Survey

Objective

The objective of the present rework phase of the program is to systematically reduce the recurring infestations on barberry properties found on the initial surveys and to locate any additional new properties. During the period of scheduled rework inspections, new bushes may develop from dormant seed in the soil. These barberry bushes must be found and destroyed before reaching fruiting maturity, which eliminates the reseeding cycle and results in practical control. After sufficient number of inspections are made to establish that no new growth is appearing, the properties are inactivated and considered in a maintenance status requiring minimum attention.

Procedures or Techniques Used

Farmstead Survey

This type of survey involves a systematic scouting of yards, orchards, woodlots, fence rows, planted groves, and timber and brush patches at the sites of and immediately adjacent to occupied or abandoned farm dwelling locations, cemeteries, school yards, and rural industrial areas. Cities and towns are given a block-by-block survey if they fall within an area selected for the farmstead work. This type of coverage is used primarily on initial work to establish the pattern of barberry distribution.

Intensive Survey

This work involves a systematic foot-scouting of all natural and planted timber and brushland, and all other uncultivated territory in the control area, including fence rows, stream banks, yards, orchards, and wood lots in urban and rural areas. Territory known to contain escaped bushes is worked by the intensive method.

Accomplishments

Survey accomplishments for the year were satisfactory and followed the work plans. Initial survey totalling 266

square miles was completed. Rework was conducted in 204 square miles in the four States and 964 previously infested properties were reinspected. Additional barberry growth was found at 215 of these old locations. At the old sites, and on 169 new properties found this year, there were 3,107,491 bushes located during survey work.

Surveys for the purpose of determining stem rust prevalence and severity were conducted throughout the principal grain areas of the four States during the 1957 fiscal year. Also, numerous collections were made of rusted grain and sent to the Federal Rust Laboratory for physiologic race determination. Unusual races identified by the Laboratory included race 75 obtained from B. fenderi in southwestern Colorado. This race has been found only twice during the past 18 years, both times on or near barberry in Washington. Other unusual collections included races 118 and 142 from Washington.

Crop Losses

In Colorado, Montana, and Wyoming, very dry weather prevailed, stem rust was present only in trace amounts, and crop losses were light. In Washington, weather conditions were favorable for rust development and the fact no losses occurred from the disease is attributed to the effectiveness of the barberry eradication program.

Recommendations

Basic policy concerning survey procedures is well established and has been adapted to fit special situations in the various States. The methods employed have been successfully used for a number of years and there are no recommendations for changes.

Eradication or Control

Objective

The initial work in any territory results in the eradication of barberry at planted locations and in areas of escaped bushes. The pattern of distribution established is the base for planning future survey and eradication work. New barberry growth continues to develop at old locations over a period of years from seed in the soil. No method has been found to determine where seed may have

been distributed or to control germination over the sizeable areas involved. With the initial eradication largely having been completed, the principal objective of the present program in Colorado, Montana, Washington, and Wyoming is to destroy all new bushes arising from seed in the soil at old barberry locations. By scheduling the work at properly-timed intervals, new bushes that have appeared are eradicated before they reach fruiting size, and the infestation problem becomes succeedingly smaller with each reinspection until maintenance control is established. Three principal results are attained: (1) progressive reduction of infestation, (2) elimination of leaf surface for control of infection causing local rust outbreaks, and (3) reducing probabilities for perpetuation of old rust races and development of new ones.

Procedures or Techniques Used

In barberry work the survey and eradication procedures in respect to common barberry are carried on as parallel and essentially coincident activities. Personnel of the survey crews carry the simple eradication tools and chemicals with them, and the eradication is done immediately when bushes are found. For destroying common barberry, a small amount of dry ammonium sulfamate (ammate) is applied at ground level to the cut-off stems or crowns. A strong water solution of the chemical similarly applied also can be effectively used to avoid leaching in lawns or to other closely adjacent shrubbery and flowers. Oil solutions of MCP and Brush Killer 32-P can be used effectively in heavy concentrations of common barberry but these situations are no longer normally encountered in the Western Region.

The hormone-type chemicals continue to be satisfactory spray materials for killing the heavy infestations of native barberry (B. fendleri) in Colorado. Both power equipment and knapsack sprayers are used, the latter for areas inaccessible to the power wagons. For foliage and dormant applications on B. fendleri, a low-volatile ester of 2,4-D is used with good results. As a foliage spray, a water emulsion of 2,4-D is applied at the rate of 1.6 pounds AHC (acid equivalent per 100 gallons of diluent.) For the dormant period of the bushes from about September to May, an oil solution of 11 pounds AHC is used.

Accomplishments

A total of 3,107,491 barberries was eradicated during the year on 215 old and 169 new properties. The spraying operations for control of the native barberry in southwestern Colorado accounted for the great majority of the 3,104,035 bushes destroyed in that State. In Montana, Washington, and Wyoming, common barberry was eradicated as single plants or as scattered bushes throughout escape areas.

Recommendations

Eradication work and results have proved adequate over a period of years. New herbicides should continue to be studied and tested at the field level as they come on the market.

Regulatory

Objective

Nursery establishments that ship barberry interstate are annually inspected and certified by Plant Pest Control personnel under Federal Quarantine No. 38. Where barberry State quarantines or laws exist, State officials inspect nurseries for control of intrastate shipments. The objective is to prevent reintroduction of rust-susceptible barberry to the eradication States, to insure truthfulness-to-type of barberry in the nursery trade, and to encourage the elimination from nurseries of rust-susceptible species of barberry.

Procedures

Nurseries that have made application for Federal inspection to qualify for interstate shipping under Federal Quarantine No. 38, are given a row-check of barberry on the premises. If the inspection is satisfactory, the nursery is certified for shipping the plants interstate. Retail dealers who ship interstate also are checked and certified in conformance with Quarantine No. 38. State personnel usually accompany the Federal inspector on visits to nursery and dealer establishments.

Accomplishments

In the Western Region 72 nurseries and two dealers were Federally inspected in California, Colorado, Montana, Oregon, Utah, and Washington. No applications were received and no nursery inspections were made in Arizona, Idaho, Nevada, New Mexico, and Wyoming. The inventory at the nurseries inspected amounted to almost one million barberry and mahonia plants, including 20,000 1-year seedlings restricted from shipment. Six of the nurseries (California 1, Oregon 2, and Washington 3) were inspected for the first time this year.

Recommendations

The regulatory phase of barberry eradication could be strengthened by dissemination to nurserymen of more information on State and Federal quarantines, and on the program in general, particularly to those who ship barberry and mahonia interstate. The inadvertent quarantine violations encountered each year might largely be avoided by such an informational program directed to the nursery trade. It may also be desirable to give consideration to more effective controls on barberry seed received in the eradication States.

Methods Improvement

Present survey and eradication procedures have proven generally effective, although continual adjustment to fit special situations is made within the framework of basic policy. Adjustments in method, intensity of survey, and area of coverage are a part of the general planning and supervision for successive reinspection surveys. In the areas of native barberry in Colorado, while present methods are effective, field trials with new spray herbicides and methods of application should be continued.

Other

Cooperation

The State Department of Agriculture participates in all of the activities of the project. The major share of funds provided by cooperators is furnished by the State Departments

of Agriculture, who also aid in developing work plans, inspect nursery stock shipped in intrastate trade, and support the program in numerous additional ways. The Western Regional Plant Board, composed of individuals representing the Departments, is interested in the overall furtherance of the work of the project. The Experiment Stations and Extension Services at the respective State Colleges provide offices, storage, greenhouse, and laboratory space, supply technical information, and assist greatly in program service aspects. Some counties furnish funds, labor, equipment, and supplies for work in their areas. Invaluable aid is received each year from the Rust Prevention Association, Minneapolis, Minnesota, which promotes barberry eradication and stem-rust control on a broad basis through various informational channels, provides program service materials and general data for both State and Federal agencies, and supplies valuable periodic and yearly stem-rust survey information.

Cooperation received during the year has been good and there are no particular places where special improvement appears necessary. The good cooperation that exists between the agencies is primarily dependent upon continued attention to satisfactory relationships between the various representatives, a regular exchange of information, an open discussion of problems, and a mutual recognition and understanding of the respective Federal and State areas of responsibility.

Funds Spent

Federal Funds

Federal funds were allotted to the States on the basis of work plans, status of programs, and personnel required to maintain work schedules. The principal expenditures were made for direct field operations on survey and eradication. The total Federal expenditure in the four States was \$58,461.00.

Cooperative Funds

Cash or equivalent sums totalling \$16,111.00 were contributed by Colorado, Montana, and Washington during the 1957 fiscal year. Virtually all of this

money was used in field work for hiring personnel, subsistence costs, and equipment and materials. The States, Counties, State Colleges, Extension Services, and other agencies furnished contributed services valued at \$9,120.00. These services included office and storage space, regulatory work, technical aid, program service, general Extension assistance, and related activities.

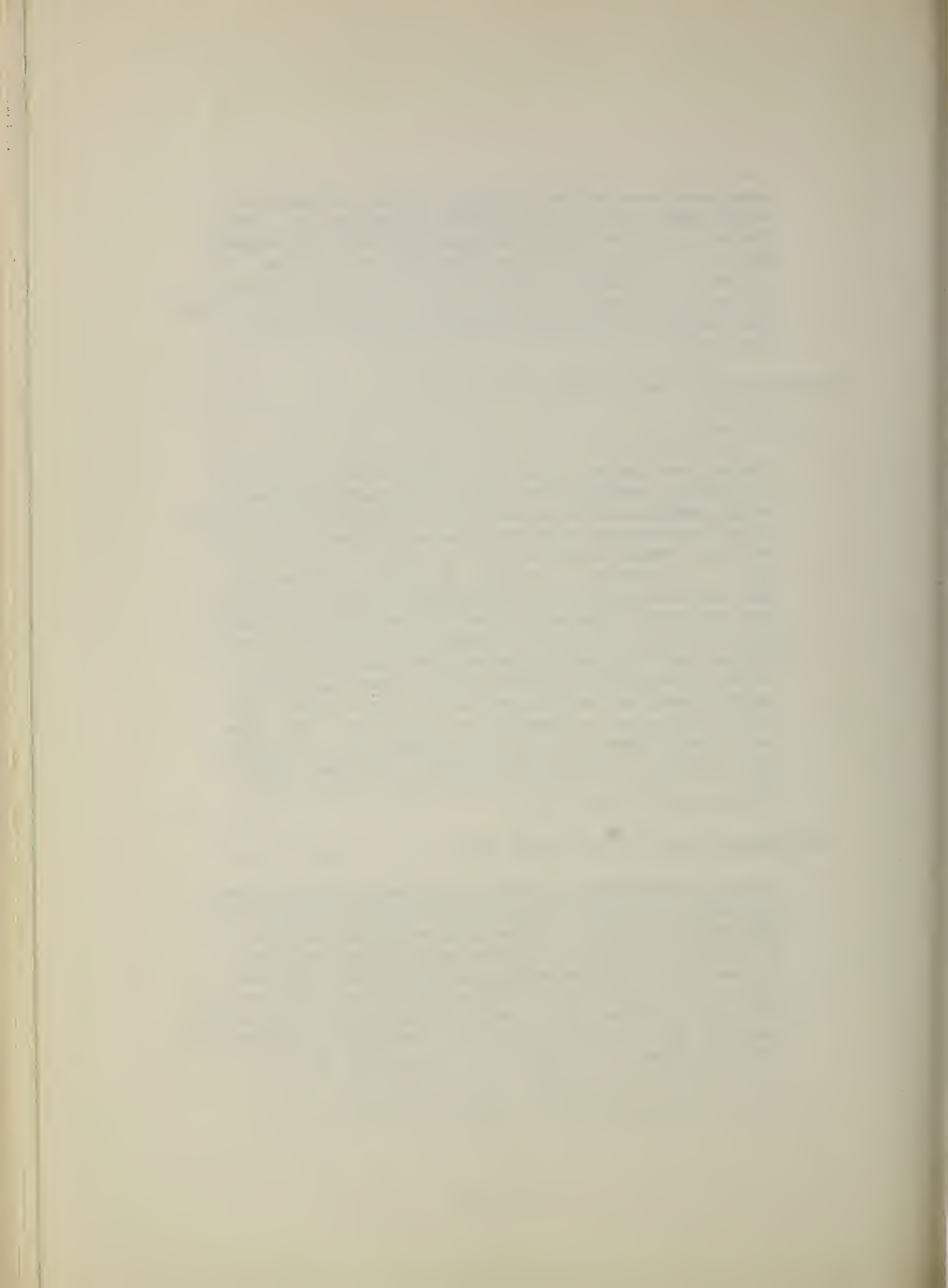
Associated Activities and Services

Program Servicing

Program service to inform the public about the work is an integral and important part of the barberry eradication program. The nature of much of the field activity brings project employees in constant contact with the property owners in the course of both city and rural work. All methods of keeping the public informed of the aims and purposes of the work are used as a direct aid to survey. During the year, in collaboration with the States and Extension Services, program personnel in the four eradication States presented informal talks on barberry and stem rust at 8 meetings, and participated in 7 public meetings. There were 8 stories released to newspapers. The color-sound film was shown 3 times and the color slides once. Exhibits were placed at 4 fairs, crop shows, and other gatherings. A total of 1,337 circulars and bulletins was distributed to the public.

Recommendations For the Coming Year

In all of the States, with the decrease in the barberry population resulting from survey and eradication efforts, the programs require increasingly effective methods of program service work. As the bushes grow more scarce, the assistance of the public in finding and reporting bushes and local stem rust spreads becomes more important. Also, the program service work serves to keep the public aware of the continuing barberry eradication problem after the main threat of local stem rust spreads is past.



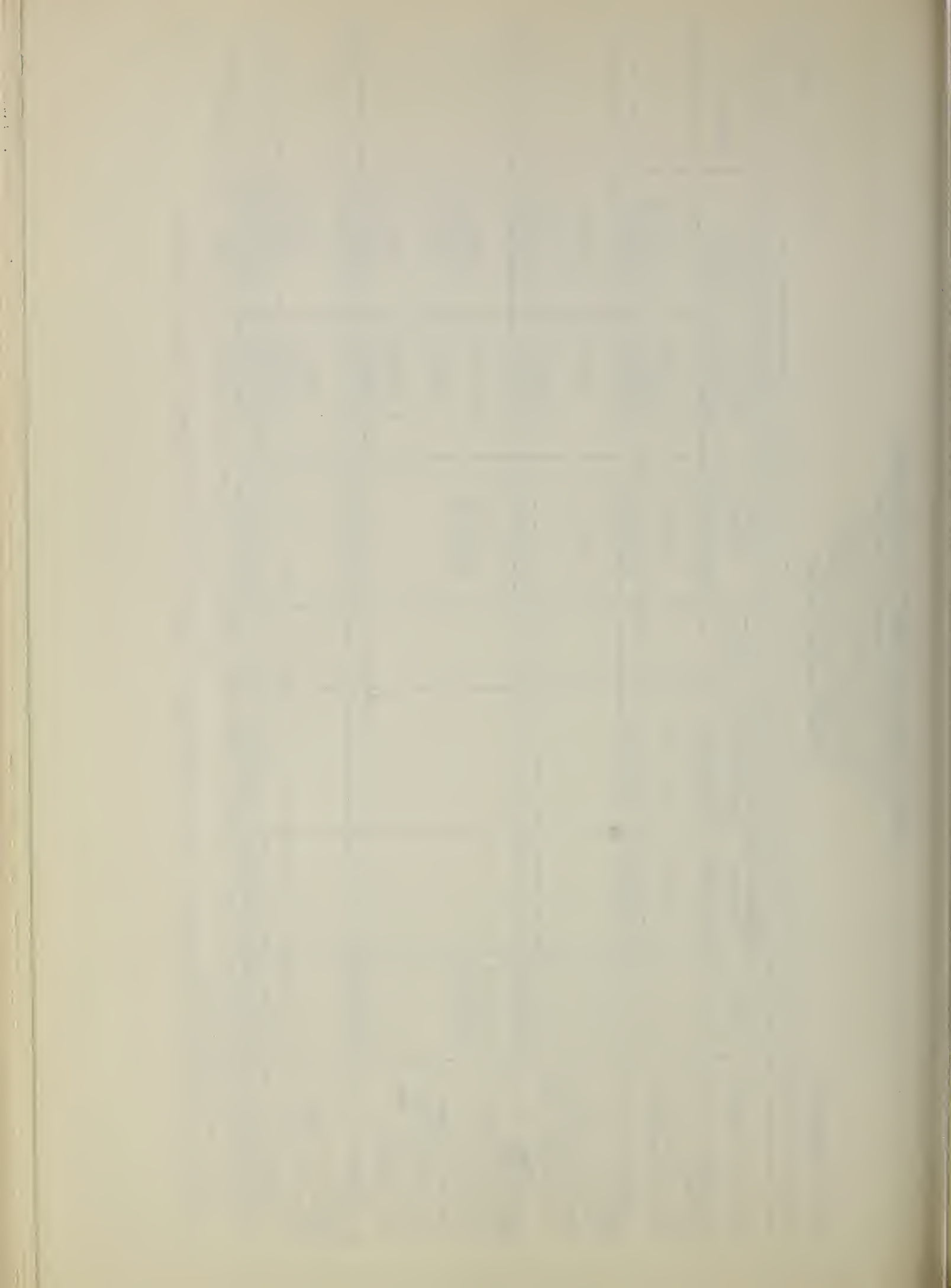
UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division
COOPERATIVE AID RECEIVED
BARBERRY ERADICATION

Fiscal Year 1957

Region Western

	1		2		3		4		5		6	7	8
State and Source of Aid			Cash and Equivalent Aid*						Total of Cash & Equivalent	Intangible Service Estimate**	Source Grand Total	Remarks	
	Cash		Personal Services	Equipment & Supplies	Space								
COLORADO													
Div. of Agric. Experiment Sta.			5,624.00	402.00					6,026.00	1,000.00	7,026.00		
Total			5,624.00	402.00					6,026.00	2,000.00	8,026.00		
MONTANA													
Dept. of Agric. Experiment Sta. & Extension Ser.	2,932.00								2,932.00	800.00	3,732.00		
Total	2,932.00								2,932.00	1,120.00	1,120.00		
WASHINGTON													
Dept. of Agric. Counties	4,465.00								4,465.00	2,500.00	6,965.00		
State College Experiment Sta. & Extension Ser. Individuals	2,688.00								2,688.00	600.00	2,688.00		
Total	7,153.00								7,153.00	1,000.00	1,000.00		
WYOMING													
Dept. of Agric. Extension Ser.										500.00	500.00		
Total										500.00	500.00		
Grand Total	10,085.00		5,624.00	402.00					16,111.00	1,000.00	1,000.00		
										9,120.00	25,231.00		

** Limited to services incidental to other activities for which only an estimated value is available.



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division
EXPENDITURES BY SOURCE AND BY ACTIVITY
BARBERRY ERADICATION

Region Western

Fiscal Year 1957

	1	2	3	4	5	6	7	8
Source of Cash & Equivalent*	Planning & Direction	Technical Assistance	Survey	Control	Regulatory	Methods Improvement	Other	Total
Plant Pest Control Division	6,176.00	1,900.00	25,099.00	23,711.00	975.00	600.00		58,461.00
Other Organizations (Name)								
States ^{1/}	200.00		7,210.00	6,013.00				13,423.00
Counties ^{2/}			2,150.00	538.00				2,688.00
Subtotal - Other Organizations	200.00		9,360.00	6,551.00				16,111.00
Total (of PPC & Other)	6,376.00	1,900.00	34,459.00	30,262.00	975.00	600.00		74,572.00
Contributed Services**								
States ^{1/}	100.00	700.00			4,000.00			4,800.00
State College ^{2/}		3,200.00	300.00				720.00	4,220.00
Individuals				100.00				100.00
Total	100.00	3,900.00	300.00	100.00	4,000.00		720.00	9,120.00
Grand Total	6,476.00	5,800.00	34,759.00	30,362.00	4,975.00	600.00	720.00	83,692.00

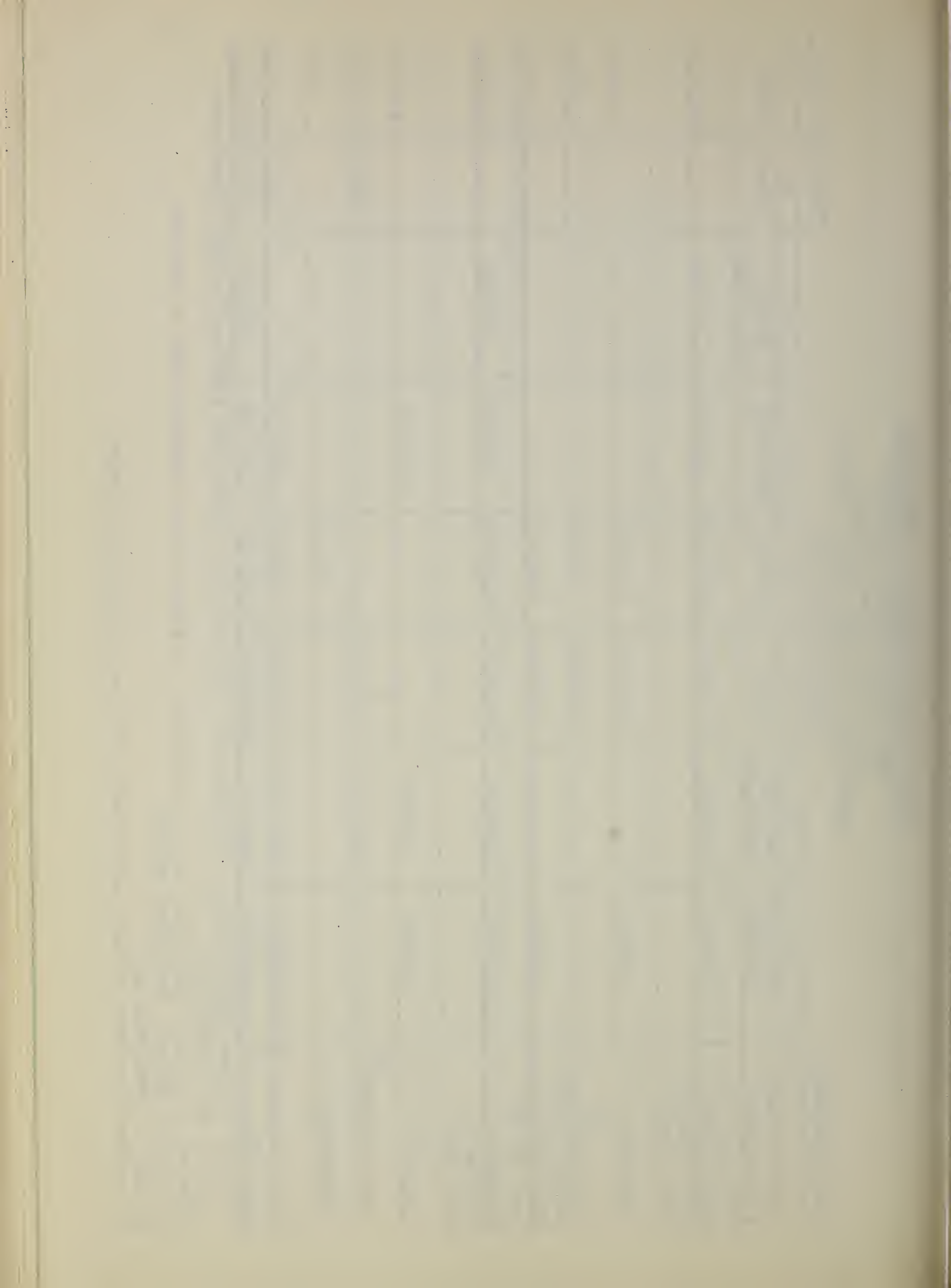
* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.

^{1/} Colorado, Montana, Washington, Wyoming.

^{2/} State of Washington only.

^{3/} Includes Experiment Stations and Extension Services in Eradication States.



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

SUMMARY OF WORK ACCOMPLISHED

Region Western

BARBERRY ERADICATION

Fiscal Year 1957

State	Square Miles Covered				New Properties			Old Prop- erties No. of Inspec- tions (8)	Old Properties	
	Initial Work		Rework		Total Cleared of Bar- berries (5)	Number Having Escaped Bushes & Seedlings (6)	Number Having Fruit- ing Bushes (7)		Total Cleared of Bushes, Seedlings, Sprouting Bushes (9)	Number Having Fruit- ing Bushes (10)
	Farm- stead (1)	Inten- sive (2)	Farm- stead (3)	Inten- sive (4)						
Colorado	0.0	0.0	10.0	75.0	13	13	13	91	82	51
Montana	0.0	0.0	0.0	13.0	0	0	0	65	8	1
Washington	258.0	8.0	0.0	106.0	156	40	149	808	125	89
Wyoming	0.0	0.0	0.0	0.0	0	0	0	0	0	0
Totals	258.0	8.0	10.0	194.0	169	53	162	964	215	141

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

SUMMARY OF CONTROL MATERIALS USED
BARBERRY ERADICATION

Region <u>Western</u>		Fiscal Year <u>1957</u>						
<u>BARBERRY ERADICATION</u>								
State	Tons of Salt Furnished by:			Kerosene (Gallons)	Chlorates (Pounds)	Ammonium Sulfamate (Pounds)	Hormone* Chemicals (Pounds) Acid Equivalent	Diluent (Gallons)
	Other Agencies	U. S. D. A.						
		Totals						
Colorado	0.0	0.0	0.0	0.0	0	10	678	2,918
Montana	0.0	0.0	0.0	0.0	0	12	0	0
Washington	0.0	0.0	0.0	0.0	0	150	0	0
Wyoming	0.0	0.0	0.0	0.0	0	0	0	0
Totals	0.0	0.0	0.0	0.0	0	172	678	2,918

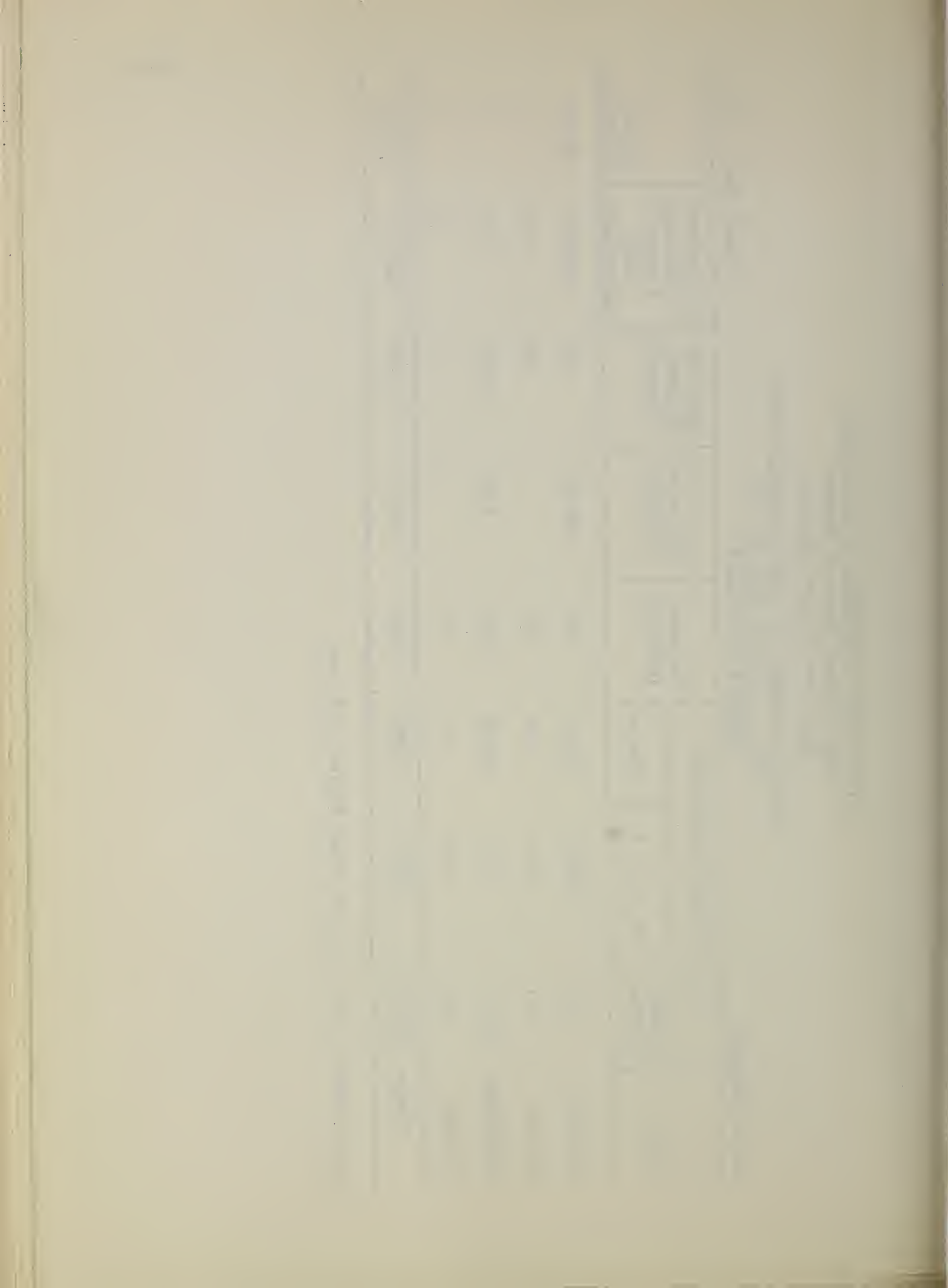
* Includes MCP, 2,4-D, 2,4,5-T, Brush Killer 32-P, etc.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

CUMULATIVE SUMMARY OF CONTROL MATERIALS USED
APRIL 1, 1918 TO JUNE 30, 1957
BARBERRY ERADICATION

Region <u>Western</u>		<u>BARBERRY ERADICATION</u>				Fiscal Year 1957	
State	Tons of Salt Furnished by:		Kerosene (Gallons)	Chlorates (Pounds)	Ammonium Sulfamate (Pounds)	Hormone* Chemicals (Pounds) Acid Equivalent	Diluent (Gallons)
	Other Agencies	U. S. D. A.					
Colorado	0.0	220.0	220.0	199,853	223	9,853.8	52,842
Montana	0.3	17.5	17.8	0	178	0.1	0
Washington	120.7	0.1	120.8	3,481	10,852	0.0	0
Wyoming	0.0	0.9	0.9	0	0	0	0
Totals	121.0	238.5	359.5	203,334	11,253	9,853.9	52,842

*Includes MCP, 2,4-D, 2,4,5-T, Brush Killer 32-P, etc.



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

SUMMARY OF CONTROL WORK ACCOMPLISHED
BARBERRY ERADICATION

Fiscal Year 1957

Region Western

State	Total Number of Barberry Bushes Destroyed on						Grand Total, All Bushes Destroyed
	New Properties			Old Properties			
	Bushes and Seedlings (1)	Seedlings and Escaped Bushes (2)	Fruiting Bushes (3)	Bushes Seedlings, & Sprouting Bushes (4)	Seedlings (5)	Fruiting Bushes (6)	
Colorado	966,980	966,980	198,496	2,137,055	0	495,893	3,104,035
Montana	0	0	0	22	13	1	22
Washington	442	202	247	2,992	240	445	3,434
Wyoming	0	0	0	0	0	0	0
Totals	967,422	967,182	198,743	2,140,069	253	496,339	3,107,491

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

CUMULATIVE REPORT OF PROPERTIES CLEARED
AND BARBERRY BUSHES DESTROYED
BARBERRY ERADICATION

Region Western

Fiscal Year 1957

State (1)	PROPERTIES					BARBERRY BUSHES DESTROYED				
	NEW PROPERTIES			OLD PROPERTIES		NEW PROPERTIES			OLD PROPS.	Grand Total All Barberries Destroyed (11)
	Total Cleared of Bushes and Seed- lings (2)	Number Having Escaped Bushes & Seedlings (3)	Number* Having Fruit- ing Bushes (4)	Total No. of Rein- spec- tions (5)	Total Cleared of Bushes and Seed- lings (6)	Number Having Fruit- ing Bushes (7)	Total Bushes and Seedlings (8)	Number of Escaped Bushes and Seedlings (9)	Total Bushes and Seedlings (10)	
Colorado	3,075	1,118	544	5,980	2,158	1,512	19,573,132	18,662,553	54,522,621	74,095,753
Montana	740	302	99	1,024	155	70	51,591	35,280	3,123	54,714
Washington	11,330	3,126	9,186	12,419	3,266	1,300	127,625	72,441	68,652	196,277
Wyoming	142	14	12	233	5	3	5,665	665	9	5,674
Totals	15,287	4,560	9,841	19,656	5,584	2,885	19,758,013	18,770,939	54,594,405	74,352,418**

* Since July 1, 1939

** Includes 73,993,712 native barberry bushes found in Colorado.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

SUMMARY OF ASSOCIATED ACTIVITIES
BARBERRY ERADICATION

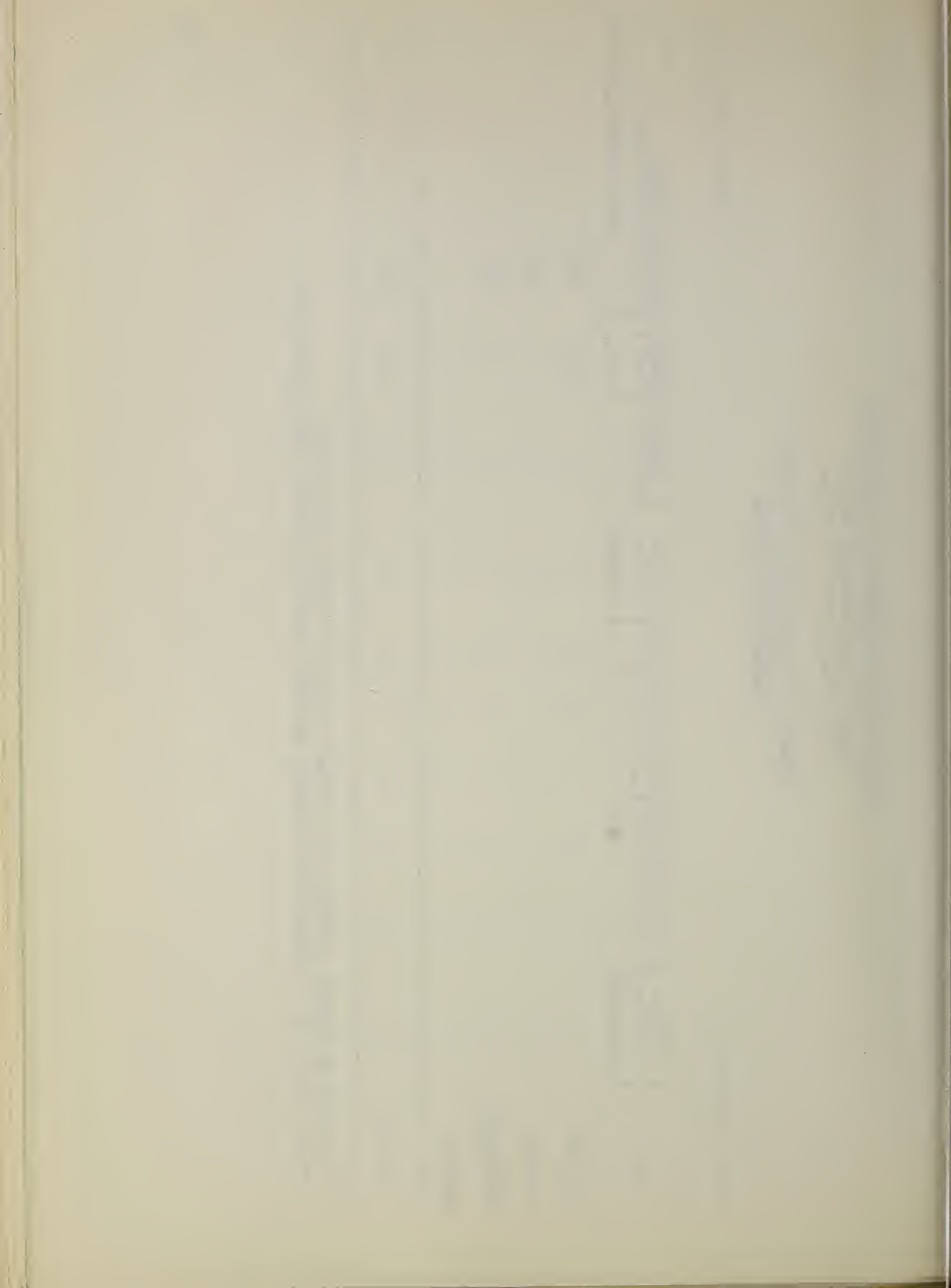
Region Western

Fiscal Year 1957

Area	Public Meetings Attended	P r e s e n t a t i o n s					Feature & News Stories*	Extent These Aids Were Used**			Special Reports	
		Talks	Slides	Films	Radio	TV		Exhibits	Bul.*	Cir.*		Infest. Maps and Posters
Colorado	7	5	1	3	0	0	5	2	300	300	0	0
Montana	0	0	0	0	0	0	0	1	0	100	0	0
Washington	0	3	0	0	0	0	3	1	0	637	0	0
Wyoming	0	0	0	0	0	0	0	0	0	0	0	0
Totals	7	8	1	3	0	0	8	4	300	1,037	0	0

* Written By Federal personnel for release direct or through cooperators.

** This should be a conservative estimate (accurate record for these items impractical).



UNITED STATES DEPARTMENT OF AGRICULTURE
 Agricultural Research Service
 Plant Pest Control Division
 SUMMARY OF NURSERY INSPECTIONS - 1957
BARBERRY ERADICATION

Region WesternFiscal Year 1957

Total number of nurseries doing interstate business
 in barberries and mahonia - 72

California	10
Colorado**	6
Montana **	3
Oregon	31
Utah**	2
Washington	20

Total Number of barberries and mahonia inspected - 983,119

Inside Area	252,565
Outside Area*	730,554

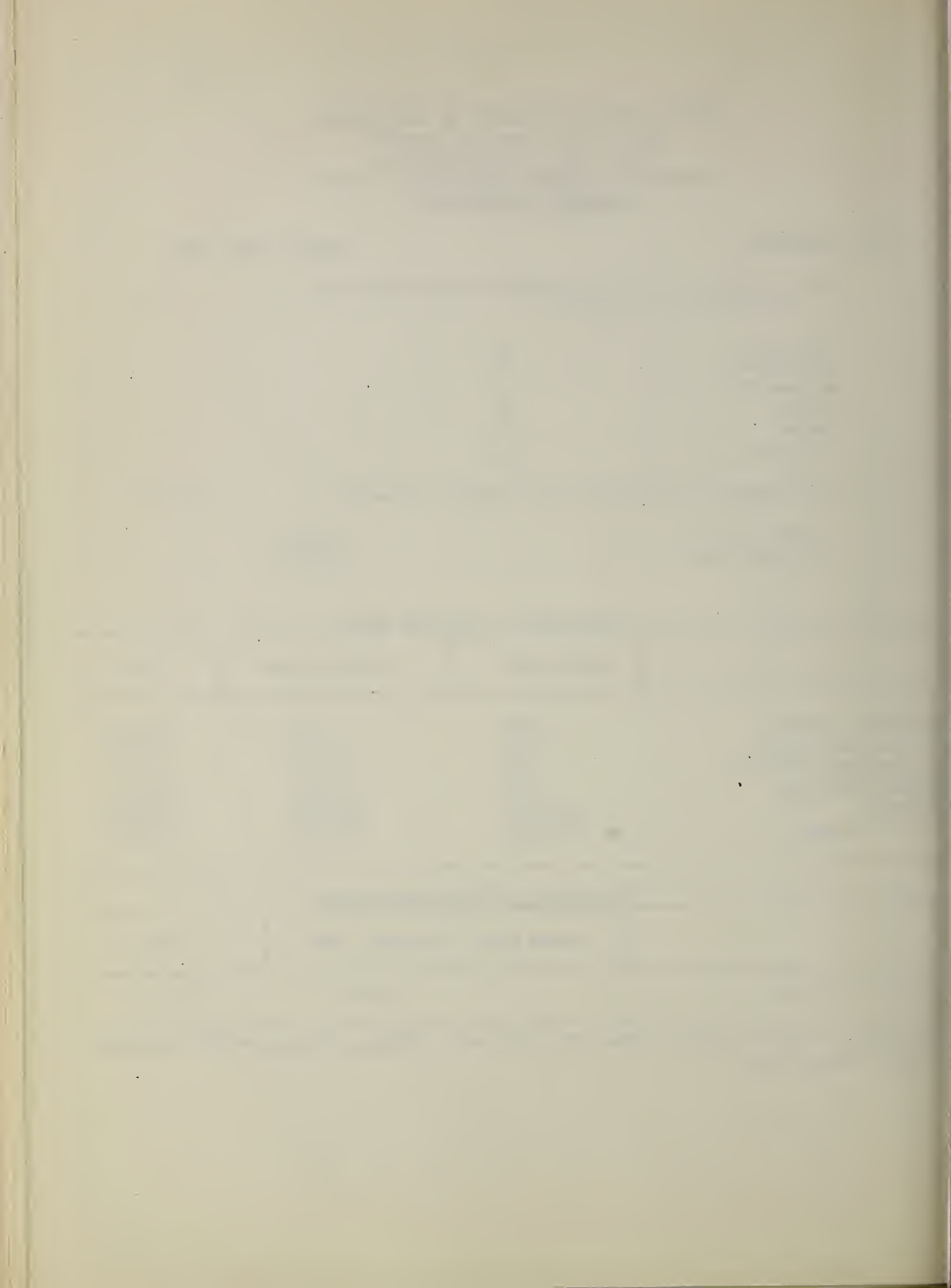
Breakdown of Approved Stock

	Inside Area	Outside Area*	Total
Berberis thunbergi	5,639	5,819	11,458
B. thunbergi atro.	4,461	31,216	35,677
B. thunbergi (other)	100	16,532	16,632
Other barberries	7,232	113,571	120,803
Mahonia	<u>235,133</u>	<u>543,416</u>	<u>778,549</u>
Totals	252,565	710,554	963,119

Breakdown of Restricted Stock

	Inside Area	Outside Area	Total
1-year seedlings	-	20,000	20,000

* States of Western Region other than Colorado, Montana, Wyoming, and Washington.
 **1956 Inspections.



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

PRESENT STATUS, PROGRESS, AND FUTURE REQUIREMENTS 1918-1957

Region Western

BARBERRY ERADICATION

Fiscal Year 1957

STATE	S Q U A R E M I L E S										PROPERTIES				BARBERRY BUSHES DESTROYED		
	Number Covered				Number Requiring Work One or More Times						Total Found To Date	Number Needing One or More Reinspections	Number Completed	Common	Native	TOTAL	
	Total in State to be Worked	Initial Work	Intensive	Farm-Intensive	Initial	Intensive	Initial	Intensive	Initial	Intensive	(12)	(13)	(14)	(15)	(16)	(17)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
Colo.	74,685	74,036	5,600	9,138	4,599	0	0	0	371	74,314	3,075	692	2,383	102,041	73,993,712	74,095,753	
Mont.	146,316	146,316	417	6,044	690	0	0	0	98	146,218	740	229	511	54,714	0	54,714	
Wash.	29,872	29,872	2,542	165	1,492	0	20	100	820	28,932	11,330	11,017	313	196,277	0	196,277	
Wyo.	94,487	94,487	558	7,367	1,267	0	0	0	15	94,472	142	21	121	5,674	0	5,674	
TOTAL	345,360	344,711	9,117	22,714	8,057	0	20	100	1,304	343,936	15,287	11,959	3,328	358,706	73,993,712	74,352,418	



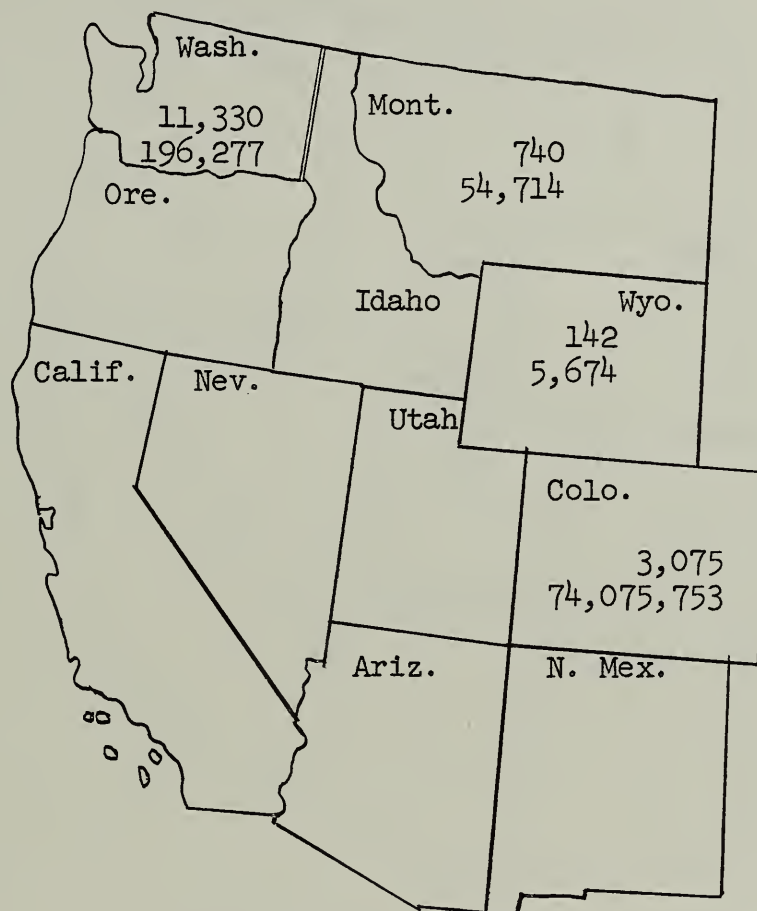
UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

24

STATES COOPERATING IN THE BARBERRY ERADICATION PROGRAM
FOR CONTROL OF STEM RUST, 1918 - 1957

Region Western

Fiscal Year 1957



UPPER FIGURE:

PROPERTIES CLEARED
OF BARBERRY BUSHES

SUMMARIZED RESULTS

LOWER FIGURE:

BARBERRY BUSHES AND
SEEDLINGS DESTROYED

PROPERTIES CLEARED 15,287

BUSHES AND SEEDLINGS
DESTROYED

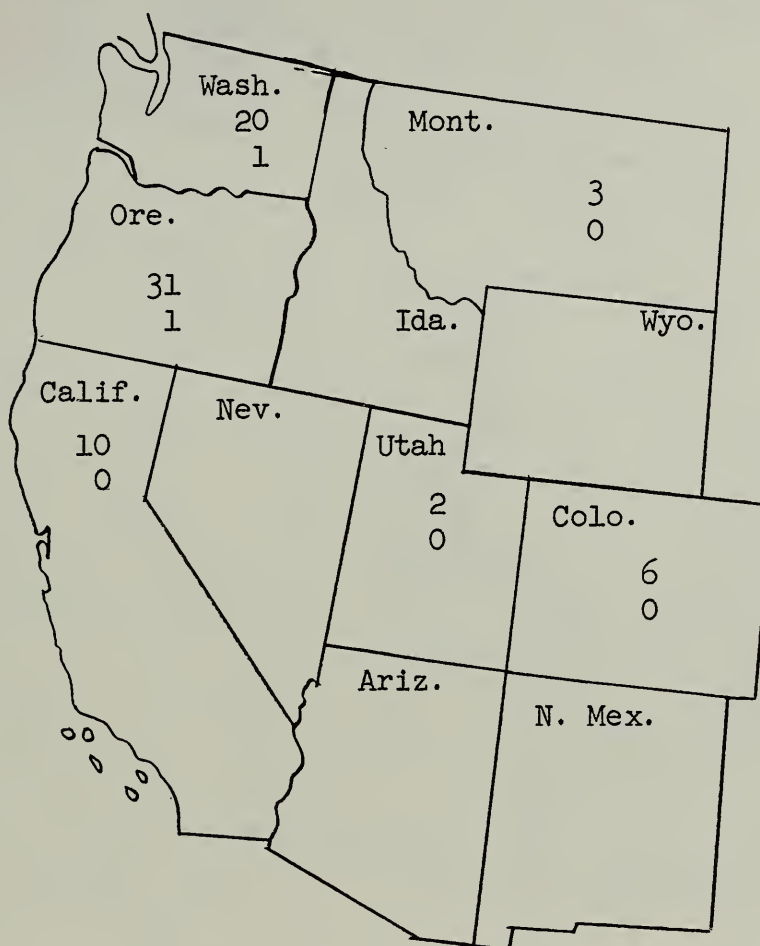
74,352,418

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

GROWERS AND DEALERS AUTHORIZED TO SHIP BARBERRIES AND MAHONIA
INTERSTATE IN CONFORMANCE WITH THE PROVISIONS OF QUARANTINE 38

Region Western

Fiscal Year 1957



LEGEND

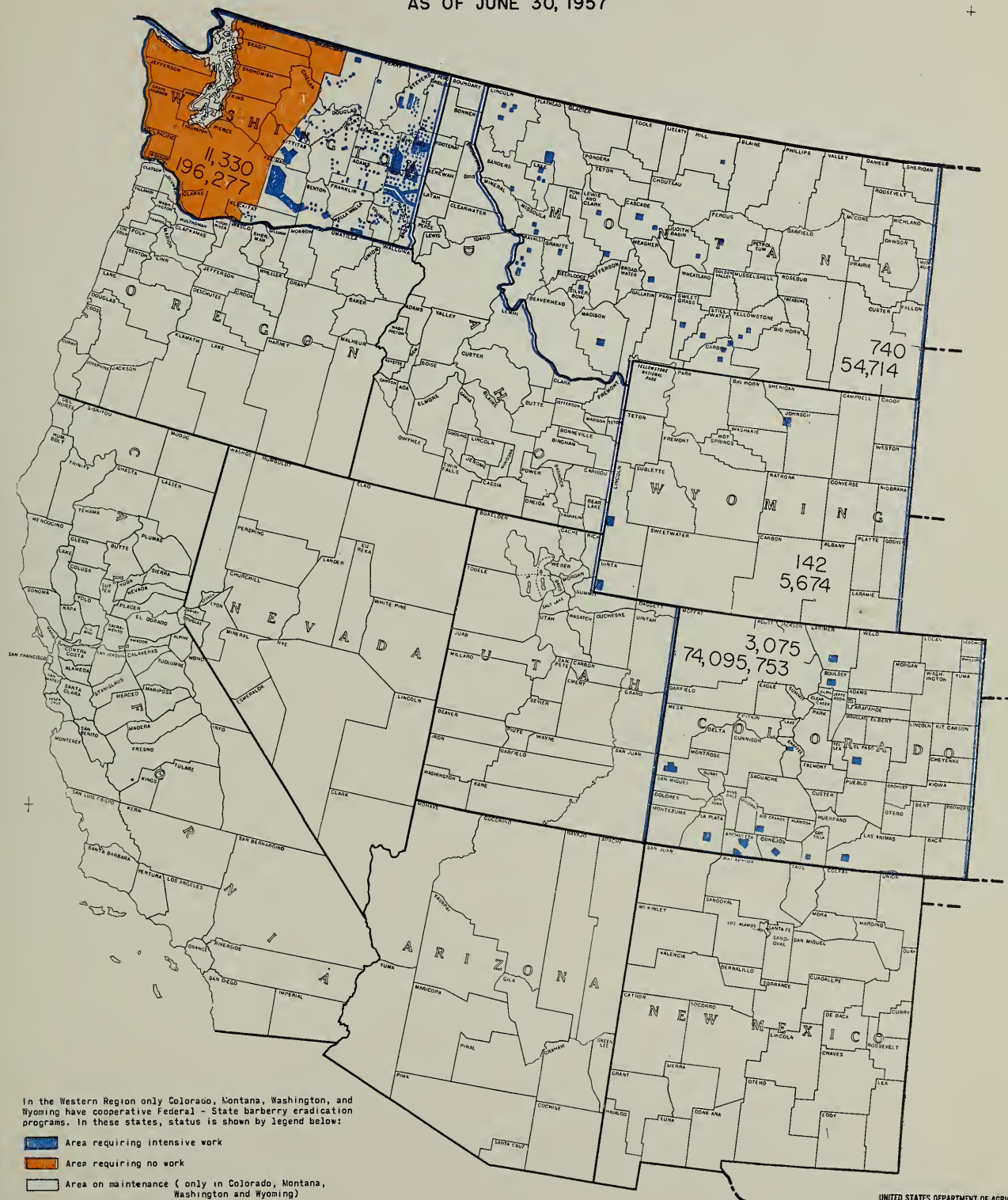
TOTAL

Upper Number - Nurseries	72
Lower Number - Dealers	2
Total plants inspected	983,119

BARBERRY ERADICATION

26

AS OF JUNE 30, 1957



In the Western Region only Colorado, Montana, Washington, and Wyoming have cooperative Federal - State barberry eradication programs. In these states, status is shown by legend below:

- Area requiring intensive work
- Area requiring no work
- Area on maintenance (only in Colorado, Montana, Washington and Wyoming)

UPPER FIGURE: Properties cleared barberry bushes

LOWER FIGURE: Barberry bushes and seedlings destroyed

SUMMARIZED RESULTS:

Properties cleared - 15,287

Bushes and seedlings destroyed - 74,352,418

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION





UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

SOUTHERN REGION

ANNUAL PROGRAM REPORT

BURROWING NEMATODE

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Regulatory, Control, Research, and Extension Agencies
of the Affected States

December 6, 1957
Gulfport, Mississippi

C. C. Fancher
Regional Supervisor

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CHAPTER IV

1898

1	Jan 1	Balance forward	100.00
2	Jan 15	Received from A. B. C.	50.00
3	Jan 30	Received from D. E. F.	25.00
4	Feb 15	Received from G. H. I.	75.00
5	Feb 28	Received from J. K. L.	100.00
6	Mar 15	Received from M. N. O.	50.00
7	Mar 30	Received from P. Q. R.	25.00
8	Apr 15	Received from S. T. U.	75.00
9	Apr 30	Received from V. W. X.	100.00
10	May 15	Received from Y. Z. A.	50.00
11	May 30	Received from B. C. D.	25.00
12	Jun 15	Received from E. F. G.	75.00
13	Jun 30	Received from H. I. J.	100.00
14	Jul 15	Received from K. L. M.	50.00
15	Jul 30	Received from N. O. P.	25.00
16	Aug 15	Received from Q. R. S.	75.00
17	Aug 30	Received from T. U. V.	100.00
18	Sep 15	Received from W. X. Y.	50.00
19	Sep 30	Received from Z. A. B.	25.00
20	Oct 15	Received from C. D. E.	75.00
21	Oct 30	Received from F. G. H.	100.00
22	Nov 15	Received from I. J. K.	50.00
23	Nov 30	Received from L. M. N.	25.00
24	Dec 15	Received from O. P. Q.	75.00
25	Dec 31	Received from R. S. T.	100.00

Total received during the year 1898 \$1,200.00

I. INTRODUCTORY

A. Statement of Problem

"Spreading Decline," caused by the burrowing nematode, Radopholus similis, (Cobb) Thorne, is considered to be the most serious threat to the citrus industry in this country. It is a problem primarily in the deep, sandy soils of Florida's central ridge area, where an estimated 75 percent of the state's citrus industry is concentrated. More than 8,000 acres of citrus are believed to be affected by the disease. Damage to commercial plants in Florida appears to be restricted chiefly to citrus and avocado, but in addition, nearly 115 species of plants, including ornamentals and weeds, are known or suspected hosts of the burrowing nematode. Normal spread of the pest through the soil is very slow, but it may be readily disseminated to noninfested localities through the movement of infested citrus and ornamental nursery stock.

B. Program Justification Statement

Competent officials of the State Plant Board of Florida estimate that, without the application of control measures, 44,000 acres would become infested by the year 1965 from the natural spread of the pest through the soil, and that the movement of diseased citrus nursery stock would further increase the infested acreage to an even greater figure. The reduction in yield varies from one grove to another, depending somewhat on the care the grove receives. In general, it is said that this disease causes a reduction of 50 to 80 percent in yield of grapefruit, and 40 to 70 percent in the yield of oranges. Since citrus production in the state of Florida is a multimillion-dollar industry, and it is estimated that Florida produces over 70 percent of all citrus in the United States, it is not difficult to envision the potential losses which this disease would inflict on the citrus industry alone if allowed to go unchecked. Many ornamentals and avocados, also, are affected by the spreading decline. The avocado production in Florida is estimated to be 40 percent of the total production of the United States, worth about \$4,000,000 annually, and ornamentals in Florida have an estimated annual value of about \$41,000,000.

C. Program Objectives

There are two objectives in the program for the control of spreading decline: first, to prevent healthy groves from becoming diseased, and second, to eliminate spreading decline when it is present in a grove. The long-term objective will be met by (1) conducting periodic surveys of nurseries and commercial groves to insure detection of all infestations and to map and delimit them preparatory to treatment; (2) assisting in the supervision of measures regulating the movement of nursery stock to prevent spread of the pest both interstate and intrastate;

(3) carrying out measures designed to free nurseries of the burrowing nematode; and (4) conducting periodic surveys in other citrus and avocado-producing states for the purpose of determining the presence or absence of the burrowing nematode.

The following means are constantly employed to realize the immediate goal of the program:

- (1) Surveys of nurseries and commercial groves in Florida to determine the presence or absence of burrowing nematode.
- (2) Mapping and delimiting of burrowing nematode infestations in nurseries and commercial groves preparatory to treatment by the State Plant Board.
- (3) A six-weeks' survey in the citrus and avocado-producing areas of other states in which this pest may become established to determine the existence or nonexistence of the burrowing nematode.

D. Changes from Work Plan

The Florida State Supreme Court declared the "push-and-treat" program for control of the burrowing nematode unconstitutional, but after several weeks of controversy, the decision was reviewed by the Court and the "push-and-treat" program was resumed on a voluntary basis. During the time that the original decision was being reviewed by the Court, employees were assigned to inspection of nursery stock and reinspection of treated grove areas to evaluate the results obtained from previous treatments.

E. Status of Infestation

The infestations of the burrowing nematode have been reduced by the push-and-treat program, but considerably more work remains to be done in locating and delimiting infestations.

II. PROGRAM HISTORICAL INFORMATION

The State Plant Board of Florida reports that spreading decline was found about 1926 in a citrus grove near Winter Haven in Polk County. Ten years later a similar decline condition was recognized in 12 groves, also in Polk County. By 1947, 54 groves were known to be affected by this unidentified disease, which by then had become commonly known as "spreading decline." The nematode causing spreading decline was discovered in 1953, and then it became possible to identify the disease in new locations. In 1956, a total of 1,053 citrus groves, 130 citrus nurseries, 179 ornamental nurseries, and 109 dooryard and other miscellaneous locations in 32 counties was found to be infested with the burrowing nematode.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

The State Plant Board of Florida is charged with the responsibilities of formulating and administering control or containment measures for the burrowing nematode. The Plant Pest Control Division assists the State Plant Board by conducting surveys of nurseries and commercial groves to detect the burrowing nematode infestations, and by mapping and delimiting infested properties preparatory to treatment by the State Plant Board.

Planning of the work was accomplished by discussions and reviews with personnel of the State Plant Board of Florida at the various levels. Plans are formulated in advance in order to accomplish the best results with personnel and funds allotted.

B. Technical Assistance

A staff of laboratory technicians trained to isolate and identify the burrowing nematode and other parasitic nematodes was maintained. Close liaison was maintained with the Fruit and Nut Crops and Nematology Sections of the Horticultural Crops Branch in reviewing new methods and procedures in combating the pest. Entomologists of the Florida State Plant Board and the Citrus Experiment Station gave assistance in coordinating the research and control phases of the Burrowing Nematode Program.

Exhibits depicting various phases of the program were maintained at State and County Agricultural fairs for the purpose of acquainting the public and citrus growers with the burrowing nematode problem and methods of control.

C. Survey

Surveys and reinspections were made statewide in Florida on a continuous basis to determine the existence or nonexistence of the burrowing nematode. Infested areas were thoroughly delimited, and in case of grove and nursery properties, maps were prepared showing the exact areas of infestation and were submitted to the State Plant Board for use in the application of control measures.

During the past fiscal year, 1,080 groves and 2,398 nurseries and greenhouses were inspected, which involved 29,642 acres in 13 of the major citrus-producing counties in Florida.

It is recommended that for another year a more thorough coverage be made of commercial groves.

1080
2398
29642
13

ORIGINAL ARTICLES

THE EFFECT OF THE VARIOUS TYPES OF DIET ON THE
GROWTH OF THE CHILDREN OF THE AMERICAN
INDIAN. By J. H. HARRIS, M.D., and
J. H. HARRIS, M.D. (Continued from
page 1000.)

THE EFFECT OF THE VARIOUS TYPES OF DIET ON THE
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J. H. HARRIS, M.D. (Continued from
page 1000.)

D. Eradication and Control

The "push-and-treat" method and the hot water treatment of nursery stock, as well as other control measures adopted, were administered by the State Plant Board of Florida. Considerable progress was made during the latter part of the year in that 2,398 nurseries and greenhouses were inspected and 26 of them were treated. During the year, 139 groves were treated, also, which brought to 1,287 the number of acres of nurseries and groves now under control.

E. Regulatory

Regulatory measures were administered by the State Plant Board of Florida. The Division assisted the State Plant Board in the supervision of measures regulating the movement of nursery stock to prevent the spread of the pest, either interstate or intrastate.

F. Methods Improvement

The change-over to taking three root samples per tree mechanically, instead of one by manual methods, has speeded up operations in survey work. The development of the water incubation method for hastening the recovery of burrowing nematode specimens from infested citrus root samples will lessen the number of days between sampling and obtaining readings from the laboratory.

The procedures used in the push-and-treat program were reviewed with the State Plant Board and some modifications were made. In subsequent push-and-treat work, the bulldozer operator will work the noninfested margins first and then proceed into the infested area. By so doing, there will be less chance of spreading the nematode from the area actually infested into the marginal area that is being pushed. In the future, the equipment will be cleaned as it leaves the infested area. Also, in cooperation with the Plant Board, new nursery regulations were reviewed and proposals made whereby planting sites of nursery stock would be approved in the future.

G. Other

The Florida Citrus Experiment Station cooperated by working with the Plant Board and the Plant Pest Control Division in developing field techniques and in the checking and development of new laboratory methods and procedures.

The Plant Board provided office and laboratory space for burrowing nematode operations at Lake Alfred, Florida.

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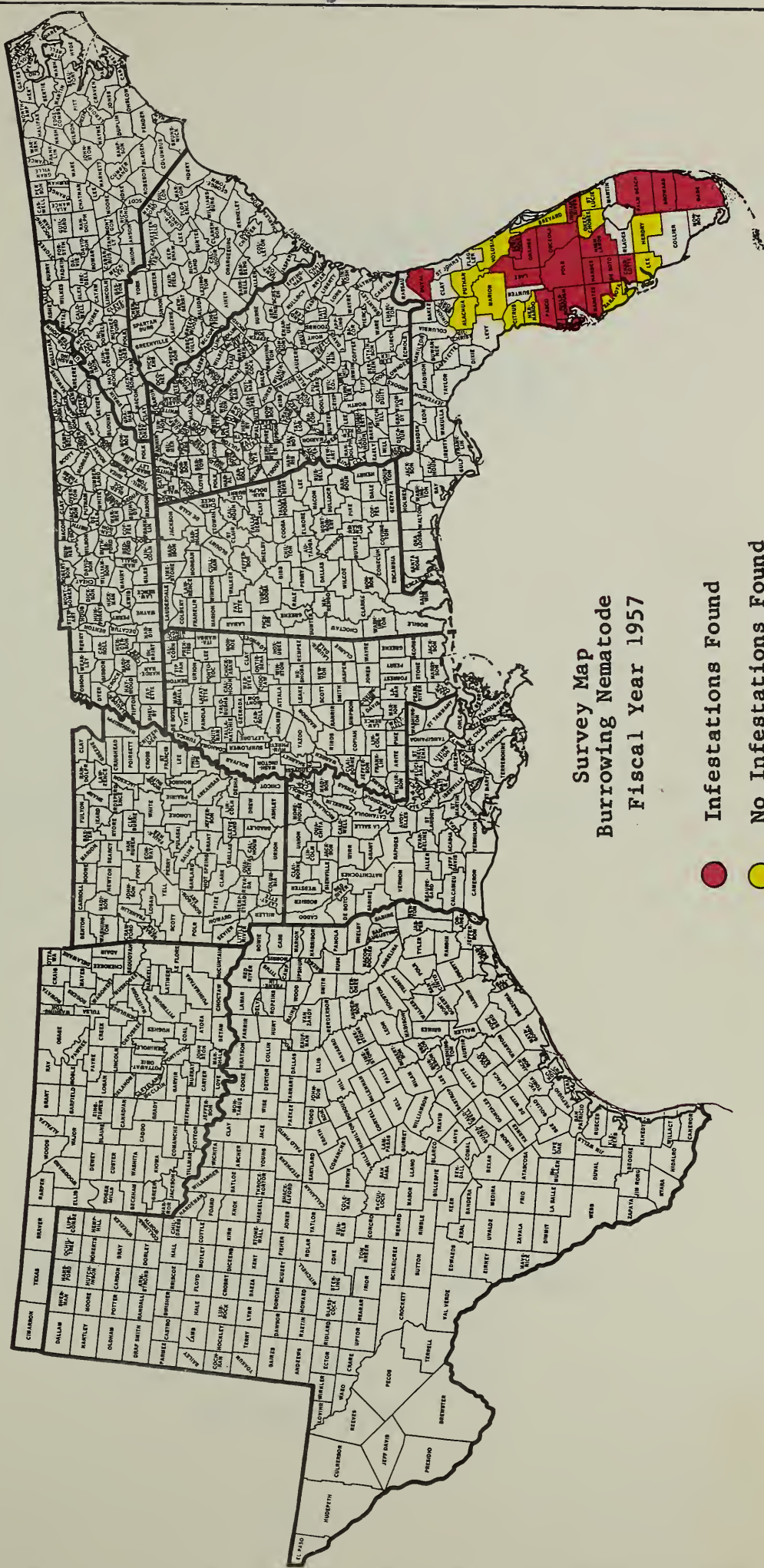
...the first of the...
...the second of the...
...the third of the...

The Florida Spreading Decline Advisory Committee, a group of private citrus growers and nurserymen, acted in an advisory capacity to the Plant Commissioner of the State Plant Board of Florida and conducted periodic seminars for the purpose of coordinating the research and control phases of the Burrowing Nematode Program.

Exhibits were set up at State and County Agricultural fairs to acquaint the public with the problems and procedures of control of the burrowing nematode program.

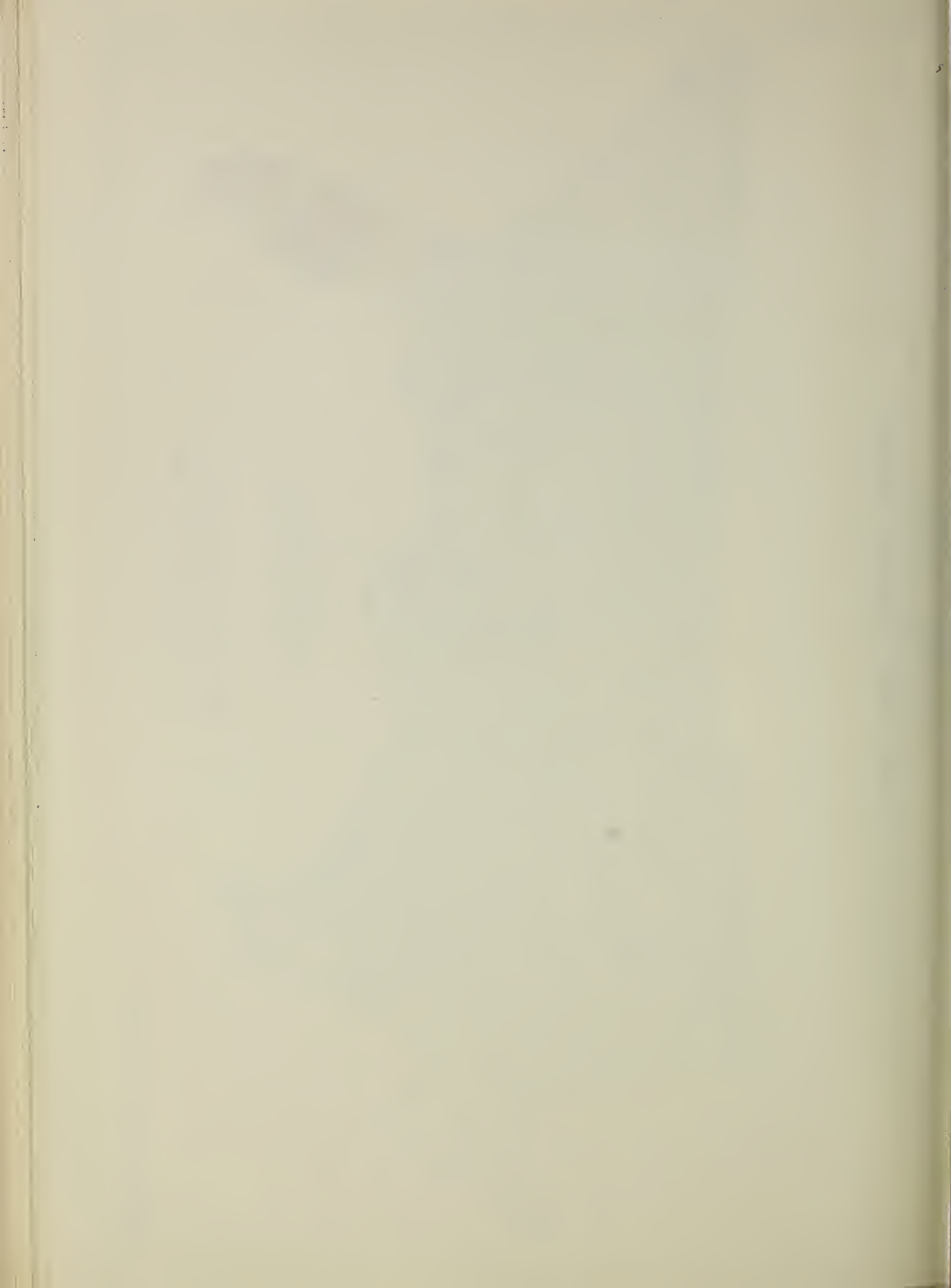
Bulletins were provided for distribution to interested parties on nematode work.

SOUTHERN REGION PLANT PEST CONTROL DIVISION



Survey Map
Burrowing Nematode
Fiscal Year 1957

- Infestations Found
- No Infestations Found



BURROWING NEMATODE

• • •

PROGRAM ANNUAL REPORT

• • •

**UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION**

* _____ *

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION

ANNUAL PROGRAM REPORT

BURROWING NEMATODE

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Arizona State Department of Agriculture
Arizona Agricultural Extension Service
Arizona Agricultural Experiment Station

October 30, 1957
Oakland, California

Jim R. Dutton
Regional Supervisor

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Program Justification Statement	1
Program Objective	1
Status of Infestation	1

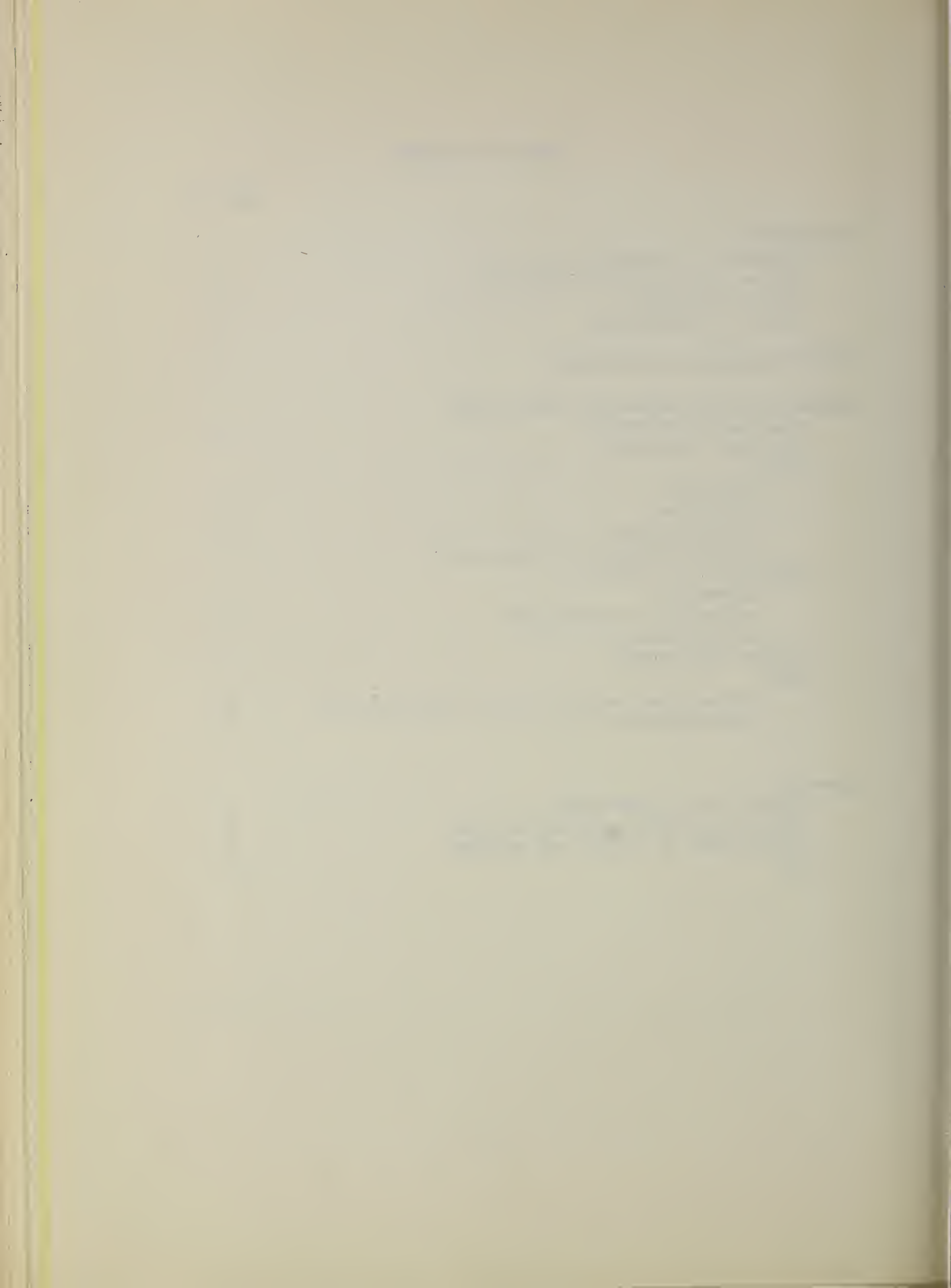
PROGRAM HISTORICAL INFORMATION 2

PROGRAM ACTIVITY DURING THE FISCAL YEAR

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Procedures	3
Accomplishments	4
Recommendations for coming year	5
Eradication or Control	
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Accomplishments	6
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COOPERATIVE AID RECEIVED	7
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INTRODUCTORY

Statement of Problem

The burrowing nematode, Radopholus similis (Cobb) Thorne, has been a menace to the citrus industry of Florida for several years. It causes spreading decline, a disease which derives its name from its characteristic manner of spreading in groves. It spreads concentrically and its symptoms are sparse foliage, undersized leaves, and small fruit. Not only does the parasite attack the roots of citrus, but some 115 plant species are included in its host list. This wide host range provides the ideal means by which the nematode can be spread. It is known that some of these host plants have been shipped to all parts of the country from areas known to be infested with the burrowing nematode.

Program Justification Statement

The survey for burrowing nematode in California in 1956 was a forerunner of such surveys in the West.

The importance of Arizona's citrus industry to the economy of the State was realized by both State and Federal agencies. The presence of decline in the groves of the State would jeopardize the citrus industry. To let it go undetected and unsuppressed would cause economic hardship on grove owners.

The 1956 crop of oranges totaled 1,310,000 boxes, while grapefruit totaled 2,000,000 boxes.

Program Objective

The purpose of the burrowing nematode survey was to determine if this nematode had become established in Arizona, particularly in the citrus-producing areas of the State. The citrus industry is concentrated into the two larger agricultural regions. The Phoenix area in Maricopa County totals 12,000 acres, while the Yuma area has 6,000 acres. Pima County (Tucson) has less than 100 acres. A few scattered small citrus plantings occur elsewhere in the State.

Status of Infestation

The burrowing nematode was recovered from an ornamental nursery within the city limits of Phoenix. The nursery is one of the larger ornamental nurseries in Maricopa County, and has six greenhouses. In the detection survey, 163 samples were taken from the entire nursery, two of which were found positive. One

positive sample came from potted Philodendron rubrum in Greenhouse No. 4, while the other came from Philodendron hastatum in Greenhouse No. 5. In the delimiting survey, 366 samples were collected from the entire nursery, the majority having been taken from the infested greenhouses. Upon examination, two positive samples were found in Greenhouse No. 4 from potted P. hastatum and Pothos species and two from Greenhouse No. 5 on P. hastatum growing under the bench.

PROGRAM HISTORICAL INFORMATION

Spreading decline, a disease of citrus caused by the burrowing nematode, is generally regarded to be the most serious threat to the citrus industry in Florida. Avocados are affected also, although not so seriously as citrus.

Symptoms of spreading decline were first noted in a citrus grove near Winter Haven, Florida, in the late 1920's. In 1953, more than 25 years after symptoms of the disease were first noted, researchers at the Citrus Experiment Station attributed the cause of spreading decline to the burrowing nematode.

The burrowing nematode is a small parasitic eelworm approximately 1/40th of an inch long. It was first found on banana roots in the Fiji Islands in 1890. Since then its presence has been reported in many tropical and sub-tropical regions of the world, including Jamaica, the Hawaiian Islands, the Philippines, Formosa, South India, Dutch East Indies, Java, Brazil, Central America, Puerto Rico and the United States.

Nearly 125 plants, including many of the common ornamentals, weeds, and vegetables, are known or suspected hosts of this nematode. While these plants do not usually show symptoms of spreading decline, they are important as carriers of the burrowing nematode. The nematode damages citrus and avocado trees by destroying a large portion of the feeder root system. The loss of these roots causes the tree to go into a state of decline, a condition which becomes more pronounced during a period of insufficient rainfall. The nematodes penetrate young feeder roots and, as the common name implies, form burrows or cavities in the cortical tissues of the roots.

PROGRAM ACTIVITY DURING THE FISCAL YEAR

Planning and Direction

Burrowing nematode surveys were conducted in California during 1956, and the citrus growing area of Arizona was considered for

the next year. Plans for the survey were discussed with the State Entomologist by Plant Pest Control Division personnel. It was decided a six weeks' survey in Arizona would give a rather complete picture of the situation, and this was conducted during the period January 14 - February 28, 1957.

Technical Assistance

Survey personnel and field equipment were furnished by the Plant Pest Control Division and the Arizona State Department of Agriculture. The Phoenix office of the Western Region provided one man to organize and supervise field activities. The State supplied an inspector who devoted full time to the survey. Four vehicles were obtained from the General Services Administration motor pool in Phoenix. State personnel used state vehicles. Technicians from Lake Alfred, Florida, were assigned by Joseph F. Spears to train the personnel assigned to the Arizona survey. These technicians also made the identification of specimens found.

Each crew leader was carefully instructed by experienced Federal personnel as to proper survey procedure, which included selecting of property to be sampled, making contacts with owner and operator, sampling techniques, proper handling and care of samples, and keeping accurate maps and records.

Survey

Objective

Survey was conducted for the purpose of detecting the presence of the burrowing nematode in properties under inspection.

Procedures

Field leader's choice of properties to be sampled was made on the basis of trees showing decline or other symptoms of poor development, groves in close proximity to host plants, nurseries containing ornamental plants, and other places favorable as harbors of the burrowing nematode.

All sampling in citrus groves and nurseries was done with round shovels. A soil auger, powered by a jeep vehicle, was available to survey personnel, but was not used. The heavier type soils would tend to adhere to the auger and the irrigation ditch borders would be damaged by the jeep.

Field work included three two-man crews which concentrated primarily on citrus groves and nurseries, and one two-man crew that worked exclusively on ornamental and residential plantings.

Root samples were collected in pint jars and delivered to the laboratory. The samples were taken from a depth of two feet or less, and under the drip line of the tree.

The collected root samples, properly labeled with field notes and maps, were delivered to the laboratory for washing and incubation. The laboratory was operated by three Federal technicians, all of whom had similar experience on other burrowing nematode surveys. Since a greater part of the survey work was to be done in the Phoenix area, it was agreed that the sublaboratory be located in the State Entomologist's quarters in Phoenix, where adequate facilities were available.

The root samples were processed in the same manner as that used in the spreading decline laboratory in Florida. The samples were washed the same day they were collected, and allowed to incubate at approximately 75° F. for a minimum of three days. All samples were microscopically examined from three to five days after the initial wash was made.

Accomplishments

The following tables represent the results of the burrowing nematode survey in Arizona:

<u>Type of Property</u>	<u>Properties Inspected</u>	<u>Acres Represented</u>	<u>Samples Collected</u>
Citrus Grove	218	6,126.00	3,626
Citrus Nursery	21	93.85	749
Ornamental Nursery	37	116.25	1,717
Other	<u>15</u>	<u>149.45</u>	<u>331</u>
Totals	291	6,485.55	6,423

Total Number of Properties Surveyed in Arizona
by County and Type of Property

<u>County</u>	<u>Citrus Grove</u>	<u>Citrus Nursery</u>	<u>Ornamental Nursery</u>	<u>Other</u>	<u>Total</u>
Maricopa	189	7	27	14	237
Pima	3	-	7	-	10
Yuma	<u>26</u>	<u>14</u>	<u>3</u>	<u>1</u>	<u>44</u>
Totals	218	21	37	15	291

Recommendations for coming year

The results of the survey gave a good indication that the burrowing nematode is not established in the areas sampled. However, the fact that the burrowing nematode was found in a commercial ornamental nursery, is evidence that the problem might arise if every precaution is not exercised. Similar surveys should be conducted periodically to determine if the pest has become established in citrus and ornamental plantings.

Eradication or Control

Objectives

Upon positive determination of burrowing nematodes in the ornamental nursery, plants were held in quarantine until eradication methods could be accomplished.

Procedures or techniques

When examination of samples was completed, action was immediately taken by State officials. All benches in the six greenhouses were washed down with a 3% formaldehyde solution. All plants under the benches in greenhouse No. 5 were destroyed and the top three

inches of soil removed. The soil under the benches was then treated with formaldehyde. The soil and plants removed were dumped into a pit located on the same property and treated with a heavy application of DD.

Accomplishments

In tracing the origin of the infested plants, it was found that the Pothos sprang from a stock that came from Puerto Rico. All Pothos on hand that came from this stock were destroyed. It was learned that the Philodendron species came from a local greenhouse that is no longer in operation.

Methods Improvement

Standard survey method, equipment and processing were used as established on burrowing nematode work elsewhere within the Division. No suggestions for improving or altering the accepted methods were conceived or made.

Other

Cooperation received during reporting year

Throughout the survey, personnel of the Arizona State Department of Agriculture made many contributions which were of major importance in making the program successful. Without the cooperation shown by property owners and operators, the primary objectives of the survey would not have been accomplished.

Recommendations

It is known that the citrus nematode inflicts a certain degree of damage on citrus groves. The fact that a rather large number of citrus nematodes was recovered from three-fourths of the groves in the state sampled, may indicate the need for a rather detailed investigation of the possible damage that this nematode may be causing in commercial groves. One interesting result was that the citrus nematode was found in 50 percent of the nurseries examined in Yuma County, while only 14 percent of nurseries checked were found infested in Maricopa County.

UNITED STATES DEPARTMENT OF AGRICULTURE
 Agricultural Research Service
 Plant Pest Control Division
 COOPERATIVE AID RECEIVED
BURROWING NEMATODE

Region Western Fiscal Year 1957

State and Source Of Aid	1 Cash and Equivalent Aid*				Total of Cash & Equiv.	Intangible Service Estimate**	Source Grand Total	Remarks
	Cash	Personal Services	Equipment & Supplies	Space				
Arizona		1,686.00	252.20	190.00	1,928.20	500.00	2,438.20	
Total for Period of Survey		1,686.00	252.00	190.00	1,928.20	500.00	2,438.20	

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.



UNITED STATES DEPARTMENT OF AGRICULTURE
 Agricultural Research Service
 Plant Pest Control Division
 SURVEY AND CONTROL CUMULATIVE DATA
BURROWING NEMATODE

Region Western

Fiscal Year 1957

State and County	Survey				Control and Classification of Infested Property		
	Detection		Infestations Found		No. Nurseries & Greenhouses Treated	Ornamental Nursery	Nursery Acres Treated
	Number Groves Inspected	No. Nurseries & Greenhouses Inspected	Number Acres Inspected	Number Prop. Infested			
Arizona							
Maricopa	189	34	4,125.5	1	1	1	.75
Pima	3	7	83				
Yuma	26	17	2,277				
Since Began Program	218	58	6,485.5	1	1	1	.75
Total for Period of Survey	218	58	6,485.5	1	1	1	.75

UNITED STATES DEPARTMENT OF AGRICULTURE

Agricultural Research Service

Plant Pest Control Division

EXPENDITURES BY SOURCE AND BY ACTIVITY

BURROWING NEMATODE

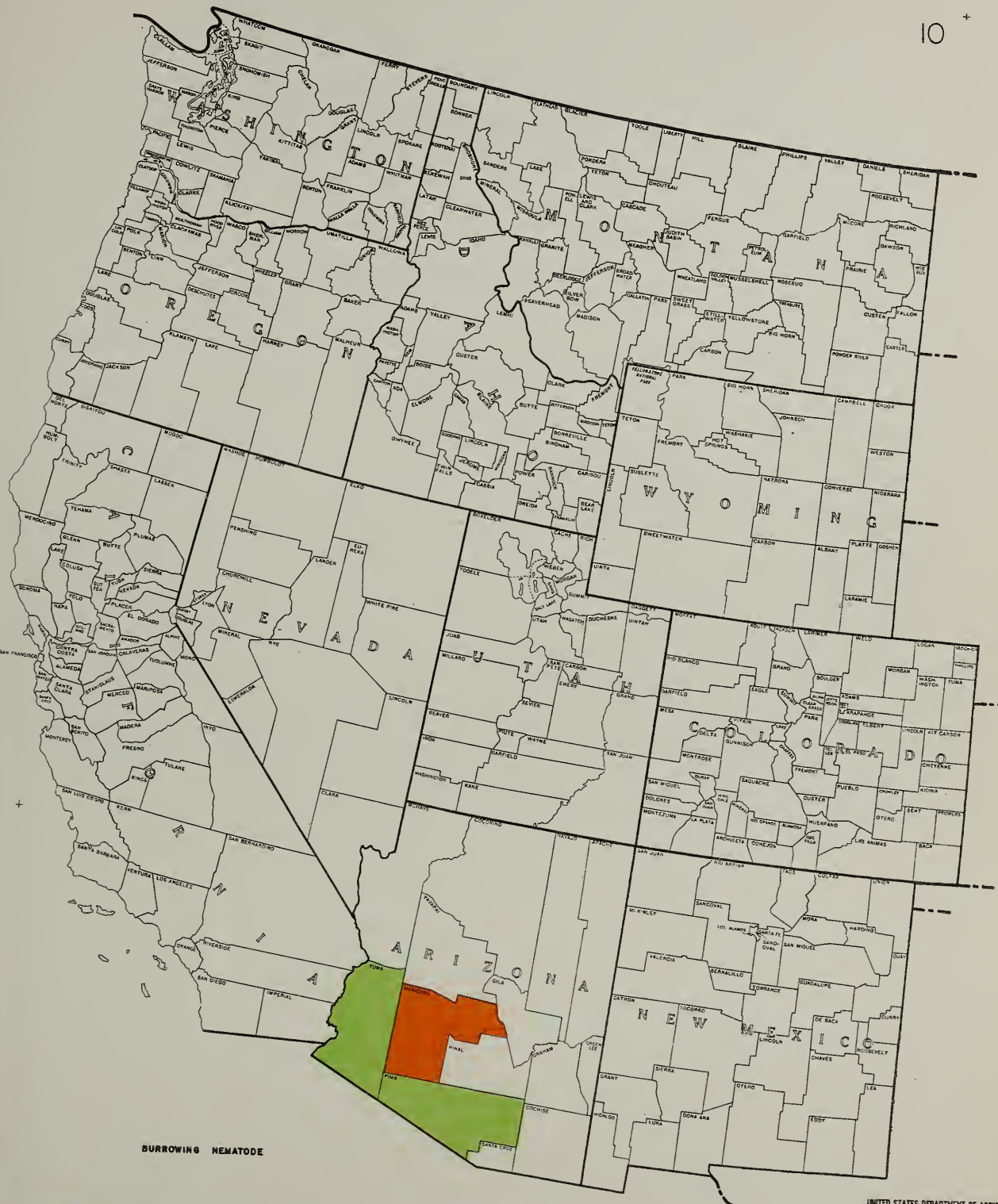
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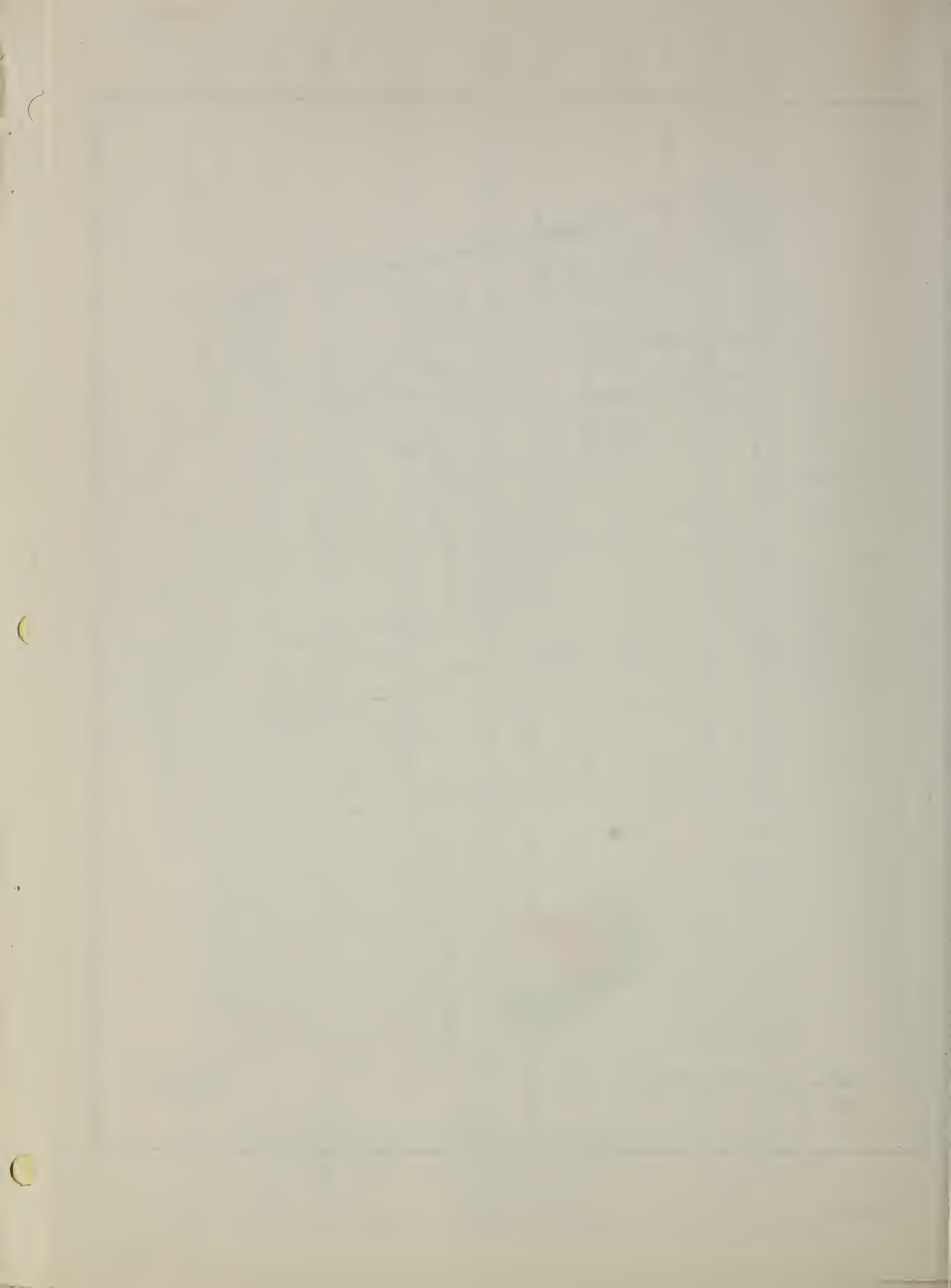
	1	2	3	4	5	6	7	8
Source of Cash & Equivalent*	Planning & Direction	Technical Assistance	Survey	Control	Regulatory	Methods Improvement	Other	Total
Plant Pest Con- trol Division	290.63		4,198.75				22.98	4,512.36
Other Organiza- tions (Name)								
Ariz. Comm. Agr. & Hort.		425.00	969.00	252.20			292.00	1,938.20
Subtotal-Other Organizations		425.00	969.00	252.20			292.00	1,938.20
Total (of PPC & Other)	290.63	425.00	5,167.75	252.20			314.98	6,450.56
Contributed Services**								
Ariz. Comm. Agr. & Hort.	500.00							500.00
Total	500.00							500.00
Grand Total	790.63	425.00	5,167.75	252.20			314.98	6,950.56

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.



UNITED STATES DEPARTMENT OF AGRICULTURE
 AGRICULTURAL RESEARCH SERVICE
 PLANT PEST CONTROL DIVISION
 WESTERN REGION



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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

SOUTHERN REGION

ANNUAL PROGRAM REPORT

CITRUS BLACKFLY

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Regulatory, Control, Research, and Extension Agencies of
the Affected States

DEC 6 1957
Gulfport, Mississippi

C. C. Fancher
Regional Supervisor

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY

RESEARCH REPORT

NO. 1000

1955

BY J. H. GOLDSTEIN AND
R. M. MARSH

RECEIVED

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I. INTRODUCTORY

A. Statement of Problem

The citrus blackfly is recognized as a very serious citrus insect pest. As early as 1949, it became obvious that this insect had spread over most of the citrus-producing areas of northeast Mexico, presenting a distinct threat to the Texas citrus industry. It was then that Texas and its citrus industry became vitally interested in a cooperative program with the United States and Mexican Departments of Agriculture in controlling the citrus blackfly in northeast Mexico to lessen the danger of its establishment in Texas. At the same time, surveys were begun along the border on the American side of the Rio Grande River. Both programs have continued without cessation, other than a few months at a time, and the citrus growers in Texas and others interested in preventing the establishment of the insect in the United States are concerned with the needs of a detection and eradication program from year to year.

B. Program Justification Statement

As long as infestations exist in areas of Mexico adjacent to the Texas border, there will be constant danger of this insect's gaining permanent foothold in the United States. The infestations found to date in the lower Rio Grande Valley of Texas attest to this fact.

Infestations, if not controlled, intensify quickly and spread rapidly. A two-year uncontrolled infestation in Mexico has been known to cause a total crop failure. The citrus blackfly has inflicted very severe damage to the fruit plantings in that country and would probably become equally destructive to the citrus industry if it became established in this country.

C. Program Objective

The long-term objective of the citrus blackfly program is to prevent the permanent establishment of this destructive pest in Texas and other fruit-producing sections of the United States. In cooperation with the Texas State Department of Agriculture, the immediate goal is to locate incipient infestations as they may occur and to eradicate this pest before it becomes widely dispersed and firmly established, which would make eradication extremely expensive and difficult, if not impossible.

All known infestations have been promptly treated by appropriate insecticides. This treatment was applied not only to trees actually infested, but also to a security zone immediately surrounding the infested trees.

2. $\frac{1}{2} \log \left(\frac{1}{2} \right) + \frac{1}{2} \log \left(\frac{1}{2} \right) = -1$

1. The first group of students, who are interested in the study of the history of the country, will be assigned to the first group.

D. Changes from Work Plan

Work plans prepared at the beginning of the year included the continued use of supervised crews of Mexican Nationals in detection surveys to be conducted in the citrus-producing areas of Texas. All survey work during the first half of the year was conducted by two crews of Mexican Nationals under the supervision of Division personnel. Shortly after the beginning of the last half of the year, surveys were expanded with the addition of two more crews of six inspectors each, and at the beginning of the last two months of the fiscal year, still another 6-man crew was added. The two crews of Mexican Nationals were transferred back to Mexico to assist with the survey work there on May 17, and all survey work during the remainder of the year was conducted by permanent Plant Pest Control Division inspectors.

E. Status of Infestation

During fiscal year 1957, fourteen infestations of the citrus blackfly were discovered in Texas, all very light and within or near the city of Weslaco in Hidalgo County. The total number of infestations since the first finding on May 31, 1955, amounted to 33 at the close of this reporting period. A tabulated summary showing the dates, locations, and degrees of infestation of all discoveries in Texas through June 30, 1957, is included in the appendix of this report. It will be noted that the last infestation found was in August 1956.

Constant vigilance should be continued so that recurring and incipient infestations may be promptly eradicated to prevent a general and heavy buildup that might be most difficult to eradicate by presently known means.

II. PROGRAM HISTORICAL INFORMATION

The citrus blackfly is of Asiatic origin. It was introduced to the new world about 1913 and was discovered on the west coast of Mexico in 1935. At the present time, this insect is found in practically all of the citrus-growing areas or sections of that country.

The first citrus blackfly, (Aleurocanthus woglumi, Ashby), ever to be found north of the Rio Grande River was discovered May 31, 1955, on a lime tree located in a tourist court at Brownsville, Texas.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

All survey work was planned and directed by supervisory personnel of the Plant Pest Control Division, Agricultural Research Service, while all control operations were conducted by the Texas State Department of Agriculture.

The University of Chicago is a leading center of research and learning. It is a place where the best minds from all over the world come to study and to work. The University is committed to the highest standards of academic excellence and to the advancement of knowledge in all fields of inquiry. It is a place where the past meets the future, and where the future is being shaped.

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The present survey method is time-consuming, and the area under supervision is quite large. An unlimited amount of this work could be done; however, the work to be accomplished is determined, of course, by the availability of funds. In the planning and direction of the work, full consideration was given to desired coverage, most susceptible areas, and proper timing.

Continued cooperation is planned with the Mexican Department of Agriculture in our mutual control and quarantine problems by assisting this agency with surveys and encouraging the eradication of light infestations in northern Mexico, as such action lessens the danger of further infestations of this insect into Texas. ~~Losses to date in Texas, which is the only area in the Southern Region threatened at this time, have been limited to the few trees that were found infested and destroyed.~~

B. Technical Assistance

Staff personnel of the State Department of Agriculture stationed in south Texas cooperated as fully as possible in assisting with survey work along with their regular nursery inspection duties. Such assistance was very important and helpful to the program, as surveys in commercial nurseries were made by State personnel.

Technical assistance, in the form of information concerning the appearance, life history, and damage this insect is capable of inflicting, was available to interested farmers and others.

C. Survey

The purpose of the surveys was to find the infestations and delimit and eradicate them as promptly as possible.

Survey methods were by visual inspections. The present and most adequate procedure yet found is the "speed-up" method, which was adopted this year. This method consists of devoting approximately five minutes per tree and enables the inspector to examine a larger number of trees per man-day than was the case when the leaf-by-leaf method was used for examining the entire tree.

No processing of collections or samples was required under laboratory conditions, other than determination of specimens found. Tentative determinations of specimens were made in the field laboratory; however, all specimens were forwarded to Division headquarters in Washington for final and official determination.

Only 29 infested trees were found on a total of 280,342 citrus trees inspected on 8,229 properties. All infestations were promptly eradicated with insecticidal sprays, as evidenced by the fact that subsequent inspections made of infested properties,

1923

infested trees, and security zones were negative.

No crop losses were experienced.

Survey should be continued and expanded as funds will permit in order to secure more coverage of the area. The greatest need is a trap and lure to replace visual inspections. It might be possible that some type of a light trap would prove effective in survey work.

D. Eradication or Control

The objective of the program is permanent eradication.

Eradication is accomplished by three applications at 21-day intervals of an oil rotenone spray. The formula is 1-2/3 gallons light weight oil, 1/2 pound rotenone (5%), and 100 gallons of water. When needed, 2 ounces of sodium triphosphate is added as a water softener. No problems were encountered in the use of this formula; however, caution was exercised in not applying when temperature exceeds 90 to 95 degrees F. Also, it should not be applied during the bloom period.

Complete eradication has resulted with the use of three applications of the oil-rotenone spray applied at 21-day intervals.

E. Regulatory

There is no regulatory work connected with the program as there are no Federal or State quarantines in effect.

F. Methods Improvement

Much thought has been given to improving survey methods. A leaf-sampling procedure was tried out this year in an effort to step up detection work and increase coverage in suspicious areas. It consisted of collecting 10 to 20 leaves from random trees examined by experienced inspectors. After a trial of two or three months, it became obvious that too much time was lost in collecting the leaves, therefore, the method was abandoned.

Problems that should be considered include: (1) research work to develop trap and lure for use in survey work; (2) climatic studies to determine if the citrus blackfly can survive under high or low temperatures, winds, and other climatic factors prevailing in south Texas, and (3) field studies pertaining to possible native parasites.

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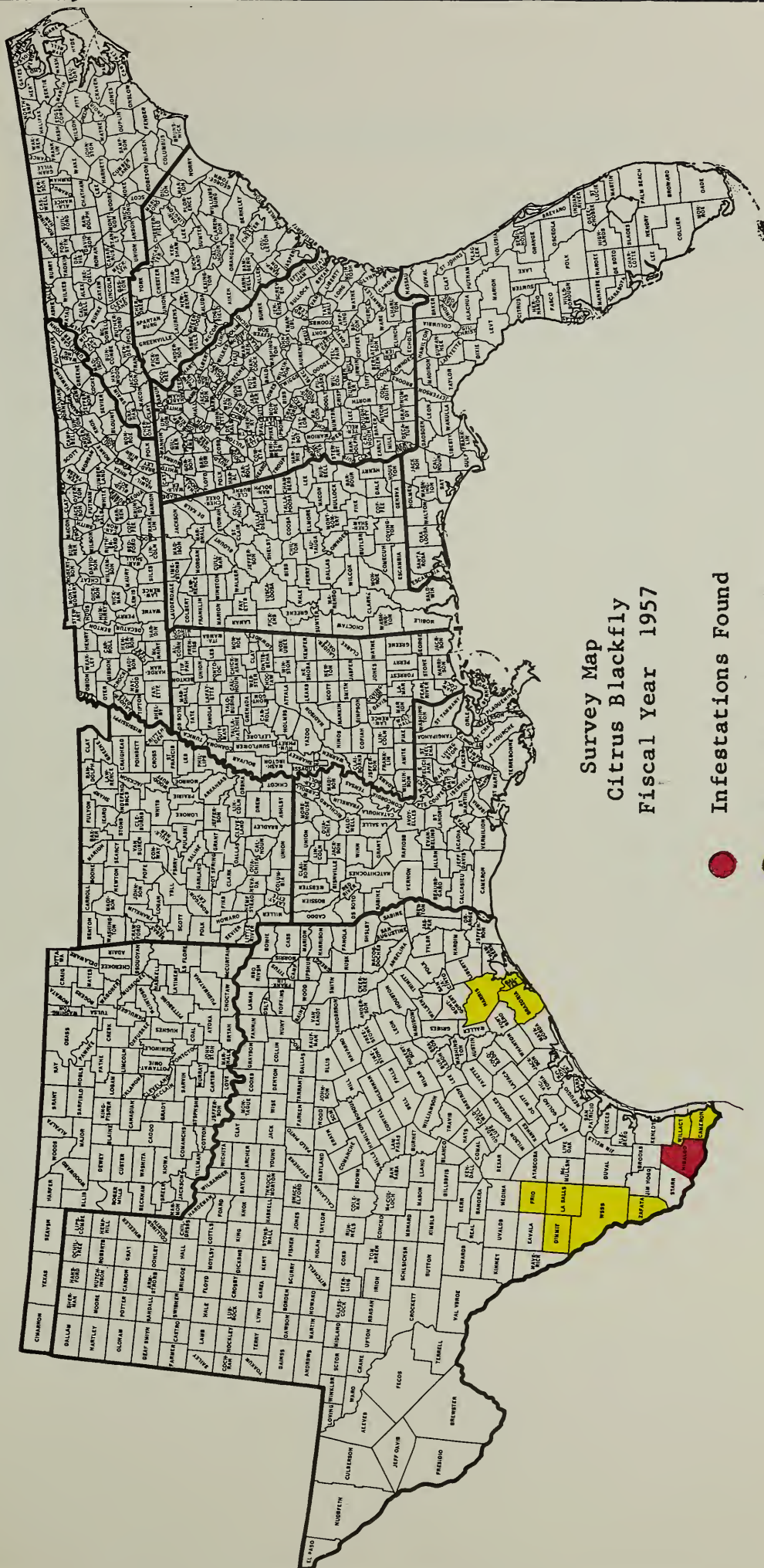
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G. Other

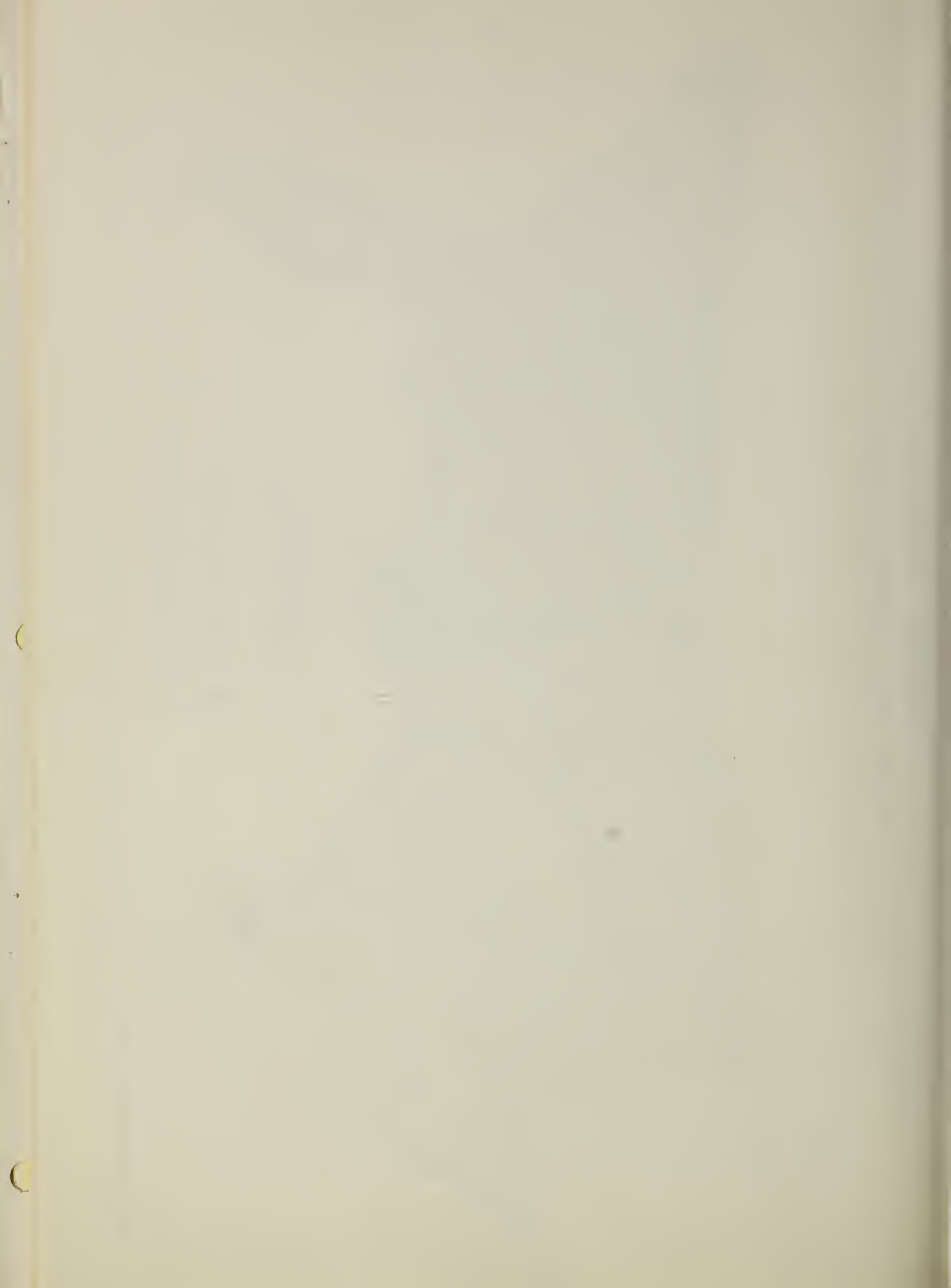
The citrus industry concerned, the State Department of Agriculture of Texas, and the State Department of Agriculture of Mexico are eager to cooperate in every way possible, not only in keeping this pest from becoming established in the United States, but also in eradicating it near the international border in Mexico. When practical means of eradicating this insect have been developed, the Mexican Government will undoubtedly launch an eradication program in that country.

SOUTHERN REGION PLANT PEST CONTROL DIVISION



Survey Map
Citrus Blackfly
Fiscal Year 1957

- Infestations Found
- No Infestations Found



RECORD OF CITRUS BLACKFLY INFESTATIONS IN TEXAS *

Date Found	Location	Name of Property	No. Inf. Trees	Amount of Inf. Material
5/31/55	Brownsville	Tropical	1	2 leaves - eggs & p.
8/8/55	Progreso	Art Beckwith	1	1 leaf - Pupae
8/9/55	Progreso	R. D. Welch	3	3 leaves - pupae
9/20/55	Laredo	Graf Motel	1	1 leaf - pupae
9/26/55	Laredo	Antonio Perez	3	3 leaves - pupae
11/18/55	Mercedes	Elden B. Smith	1	1 leaf - pupae
2/7/56	Laredo	Virginia Courts	1	1 leaf - pupae
2/21/56	Brownsville	A. H. Wilson Estate	1	2 leaves - pupae
2/23/56	Brownsville	Mercy Hospital	1	1 leaf - pupae
2/23/56	Brownsville	Lakeside Trailer Court	1	1 leaf - pupae
3/6/56	Laredo	Juan Ramirez	1	1 leaf - eggs & p.
4/3/56	Brownsville	Shang-ri-la Motel	9	10 leaves - eggs & pupae
4/4/56	Brownsville	W. F. Sylvester	3	4 leaves - eggs & p.
4/9/56	San Pedro	Germain Castillo	4	7 leaves - eggs & p.
4/10/56	San Pedro	Raul Cavazos	1	1 leaf - eggs
4/10/56	San Pedro	Ignacio Tapia	1	2 leaves - eggs & p.
4/16/56	Los Indios	Julio Ruiz	1	1 leaf - eggs & p.
5/18/56	Progreso	Art Beckwith	4	4 leaves - pupae
6/11/56	Progreso	C. R. Martin	1	2 leaves - pupae
7/24/56	Weslaco	Mrs. Pauline M. Turner	10	15 leaves - eggs & p.
8/8/56	Weslaco	Knapp Bros.	4	3 leaves - eggs & p.
8/17/56	Weslaco	Mrs. D. L. Curry	3	3 leaves - pupae
8/17/56	Weslaco	Lydia Johnson	1	2 leaves - pupae
8/21/56	Weslaco	Chas. F. Owen	1	1 leaf - pupae
8/22/56	Weslaco	Robt. L. Bookout	2	2 leaves - eggs & p.
8/22/56	Weslaco	Mrs. Cora Langley	1	1 leaf - pupae
8/23/56	Weslaco	First Methodist Church	1	1 leaf - pupae
8/23/56	Weslaco	Martin Funeral Home	1	1 leaf - pupae
8/23/56	Weslaco	E. C. Fleming	1	2 leaves - pupae
8/24/56	Weslaco	S. C. Hutchinson	1	1 leaf - pupae
8/30/56	Weslaco	M. E. Hoffman	1	1 leaf - pupae
8/30/56	Weslaco	Bonita Tourist Courts	1	1 leaf - pupae
8/31/56	Weslaco	Ted Watkins	1	1 leaf - pupae

* Includes all findings through FY 1957

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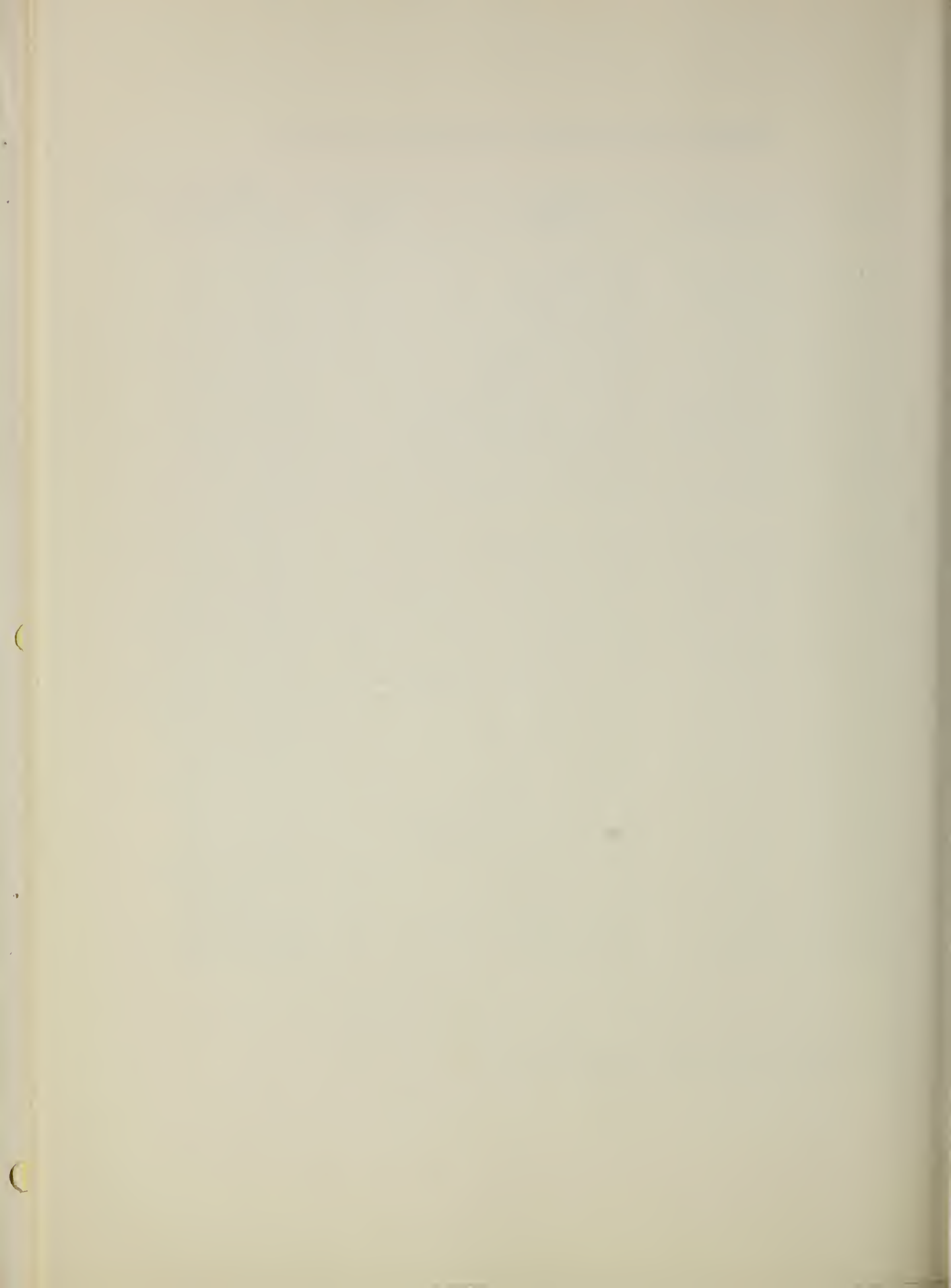
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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
CENTRAL REGION

ANNUAL PROGRAM REPORT

ECONOMIC INSECT SURVEY

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
and
State Departments of Agriculture
State Experiment Stations
State Extension Service

October 31, 1957
Minneapolis, Minn.

R. O. Bulger
Regional Supervisor

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I. INTRODUCTORY

A. Statement of Problem

The Economic Insect Survey Program is charged with the responsibility of keeping agricultural workers informed currently on insect conditions throughout the United States. The present program includes organized surveys in connection with control programs and observations and reports on the current status of all other pests of economic importance. "All other pests" also includes the prompt detection of those which have been accidentally introduced.

B. Program Justification Statement

The economy of this country is geared directly to a healthy agricultural situation. Insects and disease add to the cost of production of agricultural products. It is a well-known fact that adequate warnings while an infestation is in an incipient stage will permit effective control at a relatively low cost. Material can be moved into the area early enough to permit a prompt control program, thus avoiding costly delays.

C. Program Objective

1. The objective of this program is to provide for cooperative surveys during the active insect season which will obtain current information on economic insects to: (a) assist farmers and others in protecting their crops from attack; (b) assume prompt detection of newly introduced pests; (c) lead to a forecasting system; (d) aid in the distribution of insecticides and specialized equipment; (e) in case of necessity, provide a nationwide skeleton structure which can be expanded to combat attempts at biological warfare.
2. During the current year, these program surveys have been conducted in all the states in this region. Cooperative State-Federal programs, jointly financed, are in force in North Dakota, South Dakota, Nebraska, Kansas, Missouri, Minnesota, Wisconsin, and Illinois. Weekly reports have been filed on insect conditions throughout the season. The remaining states have provided reports on a voluntary basis as insects became a problem.

For the season, results have been good. With few exceptions, adequate and timely information has been provided to farmers and allied agricultural workers. Each of the states provide a bulletin or regular news release utilizing the information outlined by this program.

II. PROGRAM HISTORICAL INFORMATION

The present Economic Insect Survey Program was first announced on March 31, 1952. At that time it was a voluntary program, depending upon periodic reports from each of the states. These reports were to be sent to Washington, D. C., where they would be published in a weekly report as a national release on current insect conditions. Among the functions of the new program, service surveys for specific pests were administered and conducted. The public wanted an expansion of this service to include other pests. Consequently a cooperatively financed program was developed. Missouri was the first of the states to negotiate and put into effect this expanded survey program in 1953. Illinois, Kansas, Minnesota, and South Dakota negotiated similar programs in 1954. Nebraska, North Dakota, and Wisconsin joined in the cooperative effort in 1955. At the present time, negotiations are in progress in Michigan, Indiana, and Ohio.

In October 1956 program surveys were added to the over-all survey program.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

The jointly financed cooperative survey program operates under a cooperative agreement. This agreement is supplemented by a work plan. Under the terms of the agreement, the survey entomologist is a State employee working under the direction of the State clearing officer. His activities are governed by the jointly developed work plan.

Each year the work plan is subjected to a comprehensive review by the clearing officer and the assistant Regional Supervisor (Survey). Changes are jointly made and agreed upon if necessary to bring the program to date.

B. Technical Assistance

The survey entomologist is a specialist in his field. In the performance of his field work, he depends upon technicians provided by the Entomology Departments of the states. His information is released through the Extension entomologist, State Departments of Agriculture, and other agencies, depending upon the local arrangements outlined in the work plan.

The Division maintains the over-all supervision of the program. It is our responsibility to develop the program and introduce and teach acceptable survey methods for specialized surveys when they are required.

C. Survey

The program's primary purpose is to detect and delimit to a certain extent infestations of insects. For specific pests such as the potato psyllid, chinch bug, European corn borer, potato leafhopper, armyworms, and one or two others, more detailed surveys are conducted. For these surveys, areas are delimited and the infestation is evaluated and formally recorded.

D. Eradication or Control

This program's function in relation to eradication or control is completed with the original detection, and a full report to control officials is made of the pest in question. In cases of emergency, steps can be taken to arrange full participation until such time as regulatory and control programs can be arranged to handle the situation.

E. Regulatory

If in the regular course of investigations a pest subject to regulatory procedures is found, a report is filed immediately with State and Federal regulatory officials.

F. Methods Improvement

Survey work needs many of its methods improved, as procedures are often complicated and need simplification. In many cases no established procedure is available to conduct a specific survey. Division personnel should work with research people to develop acceptable field procedures whenever the need is clearly established.

G. Other

1. Cooperation received during reporting year

This program, even though it is basically financed on a 50-50 split between the State and Federal Governments, has in nearly all states been the recipient of a great deal of voluntary help. Entomologists from commercial companies contribute information, as do county agents, Experiment Station workers, and a host of others. No attempt will be made in this report to place a monetary value on these services.

2. Funds spent

- a. Federal Funds - A total of \$44,740 was spent to administer and participate in the cooperative survey program in this region.

- b. Cooperative Funds - A total of \$52,400 was spent by the cooperating states. This money represents cash or facilities and services in those states participating in a cooperative program. Several of the states participating on a voluntary program have also estimated the cost of their effort.

F u n d s

State	:	Federal	:	State
Illinois		\$ 5,700		\$ 6,630
Indiana		750		-
Iowa		1,000		-
Kansas		5,000		7,210
Kentucky		500		1,500
Michigan		750		1,000
Minnesota		5,740		4,900
Missouri		5,600		7,350
Nebraska		4,650		4,040
North Dakota		3,950		4,040
Ohio		1,430		1,500
South Dakota		4,530		5,270
Wisconsin		<u>5,140</u>		<u>8,960</u>
Totals		\$44,740		\$52,400

H. Recommendations

1. Continued effort should be put forth to include all states in the jointly financed economic insect survey program.
2. The cooperative program should be placed on an annual basis in all states.
3. This program should remain completely flexible, permitting the survey entomologist freedom to investigate all possible situations concerning economic insect conditions in his state.

Revised

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
EASTERN REGION

ANNUAL PROGRAM REPORT
COOPERATIVE ECONOMIC INSECT SURVEY

July 1, 1956 - June 30, 1957

COOPERATING AGENCIES:

State Regulatory, Extension and
Experiment Station Agencies

December 1957
Moorestown, New Jersey

H. L. Smith
Regional Supervisor

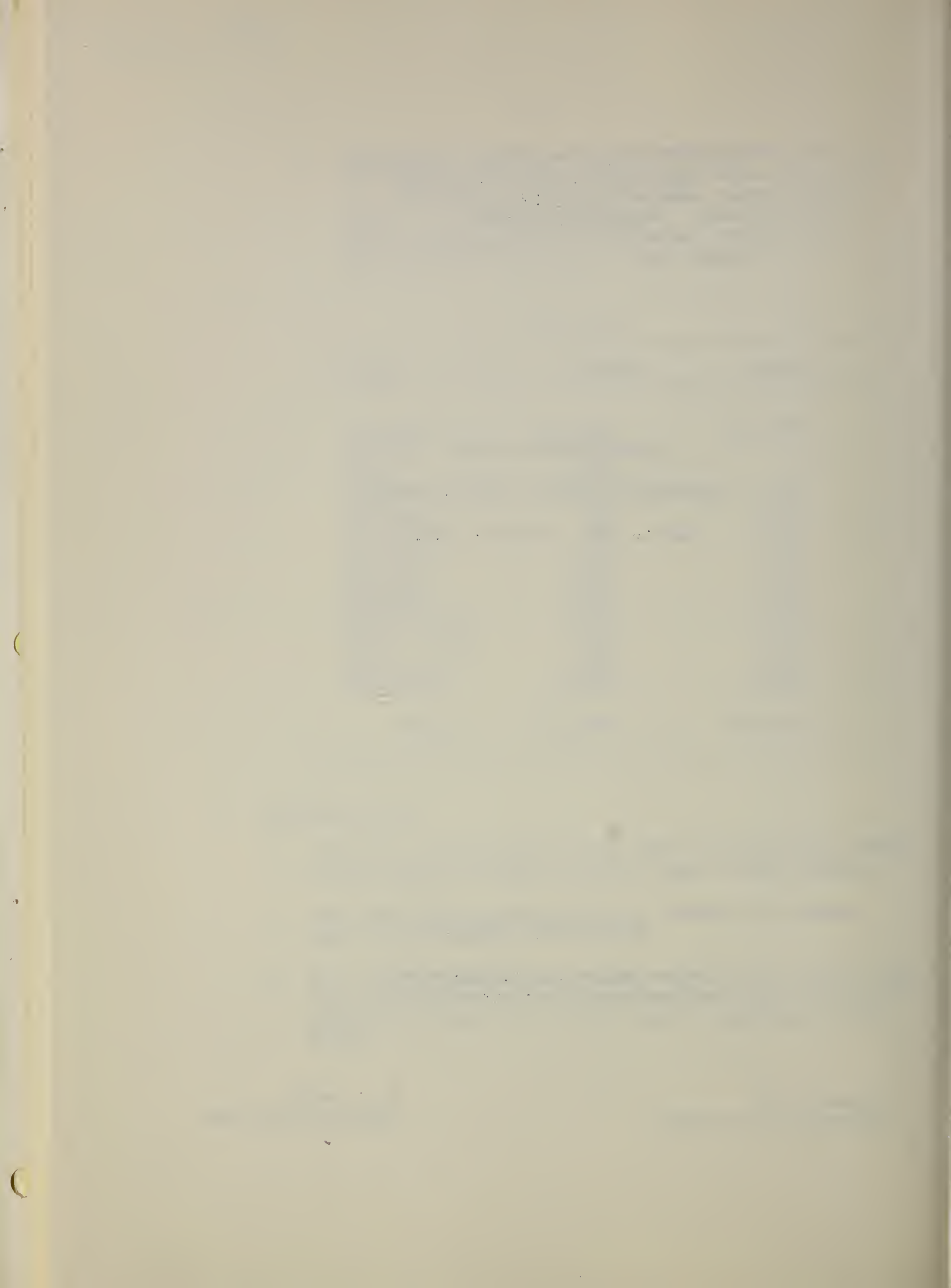
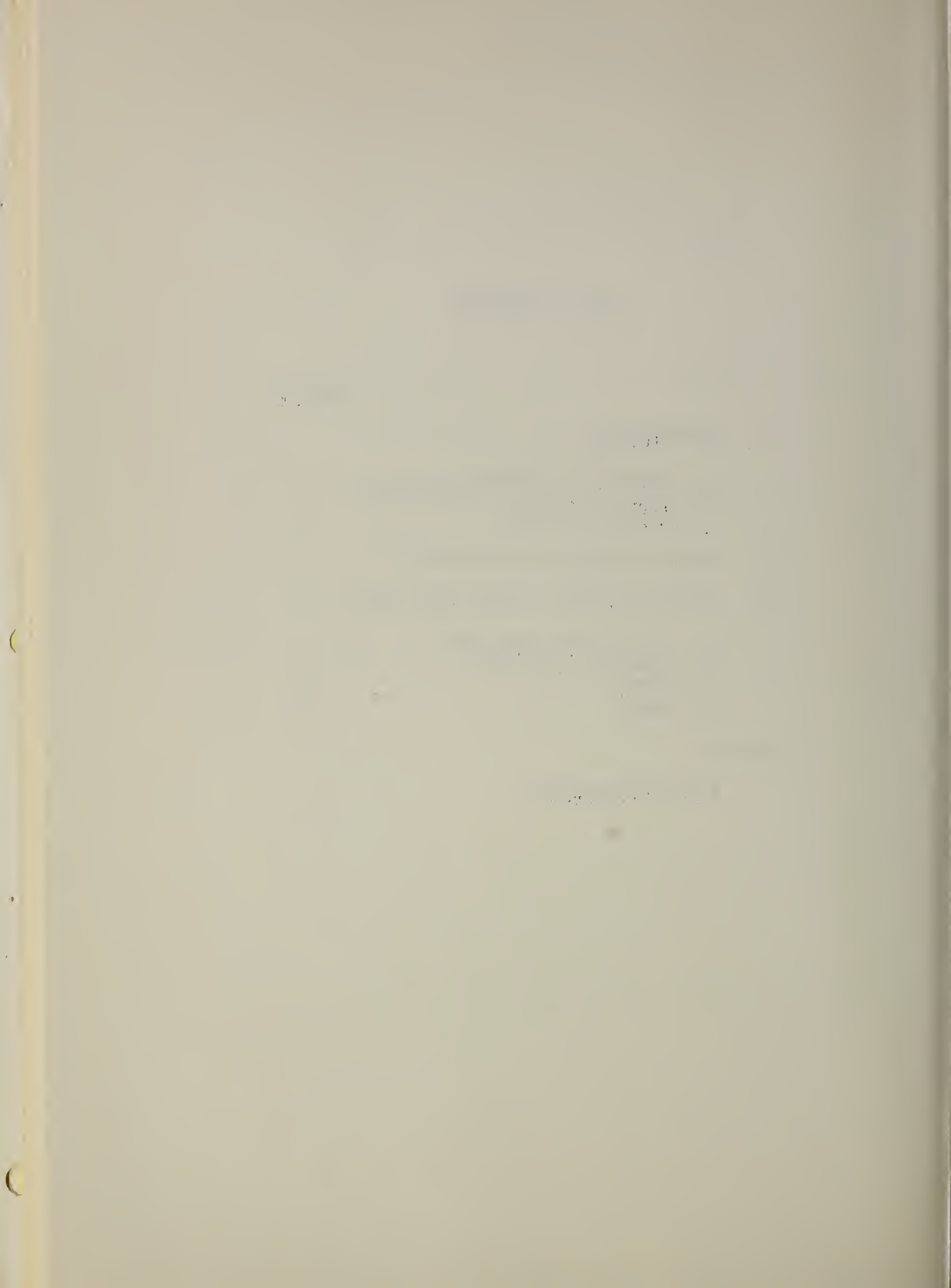


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Appendix

List of Cooperators



I. INTRODUCTORY

A. Statement of Problem

Each year a portion of the nation's food supply is destroyed by insects before the crop matures or before the farmer has had an opportunity to harvest it. When conditions are unfavorable for the development of the insects, this loss is insignificant, however, when conditions favor their rapid increase we have what is a serious situation and a total crop loss may be the result. This is a continuing fight with most native and introduced pests and requires constant vigilance. Insects, in addition to being a threat to man's food supply, also attack his animals, his home, and even his person, therefore, virtually everyone is involved. This fight is carried on by individuals working with the advice or under the direction of public or private agencies. In this, as well as any other fight, one of the prime requisites for success is intelligence concerning the activities of the enemy.

The program is carried on primarily by public entomologists, private cooperators, and industry. The Federal government serves as a coordinator or a central assembly and distribution point for information. No other way has been found to assemble and disseminate such information on a nationwide basis.

B. Program Justification Statement

No accurate estimate has been made of the damage caused by economic insects in all categories due to the complexity of the problem. It has been estimated that each year the nation loses approximately four billion dollars worth of agricultural crops due to the activities of insects. It can be assumed that a reasonable proportion of this loss occurs in the Northeastern States. In any event, it represents an enormous figure and can be substantially reduced by timely and adequate action based on accurate information obtained from surveys.

C. Program Objective

1. To assist farmers and agricultural workers to protect crops by supplying current information on insect activity.
2. To aid manufacturers and suppliers of insecticides and equipment to determine where supplies are needed.
3. To aid and assure prompt detection of newly introduced insects.
4. To develop a workable insect-pest forecasting service.
5. To develop nationwide uniformity in reporting insect conditions.

6. To determine losses by insects.
7. To maintain records on occurrence of domestic and foreign economic insects.
8. To provide a nationwide organization for biological warfare defense as it relates to insects.

II. PROGRAM HISTORICAL INFORMATION

Various insect surveys have been carried on by most of the States over a period of many years. The Entomological Society of America has long recognized the value of this work and the need for bringing information together in one central point from which it would be available to all. A committee was appointed to study this problem and as a result of their recommendations the Bureau of Entomology and Plant Quarantine, in April of 1951, invited State and Federal and private Entomological workers to cooperate in this work. Letters were sent to the heads of the following agencies in each State and Territory: State Department of Agriculture, the Director of the Extension Service, and the Head of the Experiment Station in the Land-grant Colleges. Representatives of these three agencies met and designated one person as a State Clearing House (see attached list) through which all information regarding insects would be screened and released for State use. Appropriate information would be forwarded to the Bureau to be consolidated with other State reports for national release. It is the ultimate goal with this cooperative effort to develop a nationwide network of qualified people who will report their findings on insect developments to this Clearing House for the use of farmers, entomologists, other agricultural workers, and commercial interests. Within a relatively short while each of the 48 States, as well as the Territories of Alaska, Hawaii, and Puerto Rico, had established such Clearing Houses.

The Cooperative Economic Insect Report was first issued on a weekly basis in May of 1952. This report has continued since and is now being mailed to approximately 3,000 persons concerned with this problem. As the information is received, it is also filed and classified for use of the public. This file now contains over one-half million notes on some 25,000 domestic and 20,000 foreign insect species.

In order to increase the value of the information and to insure more uniformity in the manner in which it was collected, a manual of survey methods was published. The techniques employed for making surveys for the various insects were submitted by cooperating agencies and published for the information of all. The Entomological Society of America has a permanent committee whose duty is to review all phases of this work and make suggestions for its improvement from time to time.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

1. The work in each State is under the direction of the individual designated as the State Clearing House. In some instances, a full-time Survey Entomologist is employed for all or part of the year depending upon the needs and available funds. These men are all Entomologists and, in many cases, specialists in survey work. When the program was instituted in each state, work plans were prepared by these men and reviewed with Department employees. The work plans are under constant review, particularly at the end of the survey season. Changes are usually of a minor nature.
2. Recommendations for the coming year
 - a. Continued efforts should be made to obtain closer coordination and cooperation between Division employees and the Clearing House Entomologists in each state.
 - b. Formal cooperative agreements are now in effect in the following states in this Region: Maryland, Rhode Island, Virginia, and West Virginia. An agreement with Delaware is to become effective July 1, 1957. Requests have been received from three other states for Federal funds to pay a portion of the expenses of employing a full-time Survey Entomologist. Serious consideration should be given to these requests. It is estimated that an allotment of \$2500 to \$3000 for each state would enable them to employ such individuals and greatly expand the survey work.
 - c. Attempts should be made to establish and secure the services of a State Advisory Committee in each state. These committees could render aid in reviewing the work, make suggestions for its improvement, and assist in obtaining more voluntary cooperation on the part of industry and individuals in reporting insect conditions to the State Clearing House.

B. Technical Assistance

The techniques employed in making surveys for the various insects have been, for the most part, developed by State personnel. The survey methods manual at present lists 45 insects. The Division has established a procedure providing for the prompt and authentic identification of insect specimens submitted by the State Clearing House.

C. Survey

The objectives of the survey are listed on pages one and two, but much other incidental information is obtained such as the effect of various farming practices, ecological and climatic conditions on insect populations, probable carryover from one season to another; and improved survey methods. Another very important objective is the early detection of insects that become newly established in a given area. The information obtained on surveys can also be of great value to both applied and academic Research Entomologists.

The procedures or techniques used by the Survey Entomologist are for the most part as outlined in the survey methods manual. Where the particular problem is not covered in the manual, he will usually devise his own survey method or employ one used by other recognized entomologists. The laboratory work consists of identifying specimens or if necessary forwarding them to the Department for identification. In addition, small collections are maintained as an aid in future identification.

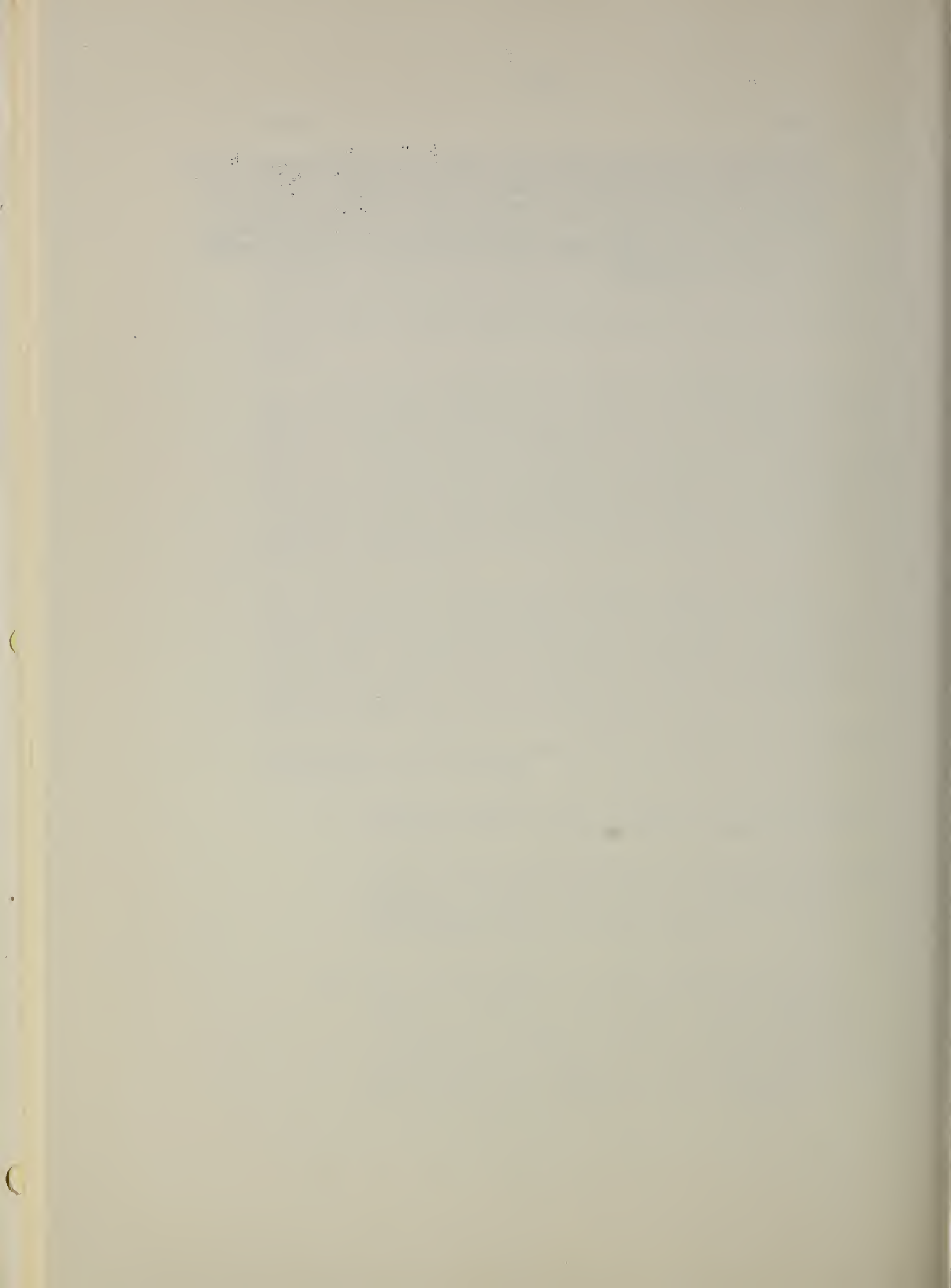
Over 325 weekly reports were received from the various States during the fiscal year. Each of these reports contained notes regarding the current situation on some 20 to 30 insects. In addition, condensed summaries giving the over-all picture for the season and lists of the more important insects in the different States were submitted.

Recommendations for the coming year as they apply to survey activities are as follows:

1. Increase efforts in the attempt to determine more accurately the crop losses due to insect activity.
2. Invite Survey Entomologists to meetings of Division personnel in the various areas in order that they may become better acquainted and have a clearer understanding of each others work.
3. Hold a conference of Survey Entomologists in the Region to consider such mutual problems as increased use of light and other traps in detection or abundance surveys. Review work plans for the various adjacent States or other areas where problems, crops, and insects are very similar in order to obtain closer coordination of the work.

D. Other

Cooperation received during the reporting year from the States represents the majority of the work performed. It is their program conducted in their own way with such coordination as the Division can effect. Virtually all of the survey work, reporting, and summarizing was performed by them and largely at their own expense.



<u>STATE</u>	<u>CLEARING HOUSE</u>	<u>SURVEY ENTOMOLOGIST</u>
Connecticut	Mr. J. Peter Johnson Assistant Entomologist Conn. Ag. Exp. Sta. New Haven 4, Conn.	
Delaware	Mr. Donald Mac Creary Prof. of Entom. Univ. of Del. Newark, Del.	Dr. H. E. Milliron Asst. Prof. Entom. Univ. of Del. Newark, Del.
Maine	Dr. G. W. Simpson, Head Dept. of Entom. Univ. of Maine Orono, Me.	
Maryland	Mr. T. L. Bissell Ext. Entom. Univ. of Md. College Park, Md.	Mr. Wallace C. Harding, Jr. Ext. Instr. Entom. Univ. of Md. College Park, Md.
Massachusetts	Dr. E. H. Wheeler Prof. of Entom. Univ. of Mass. Amherst, Mass.	
New Hampshire	Dr. J. G. Conklin Prof. of Econ. Entom. Univ. of N. H. Durham, N. H.	
New Jersey	Dr. B. B. Pepper Prof. of Entom. Rutgers Univ. New Brunswick, N. J.	
New York	Dr. A. A. Muka Entom. Dept. Cornell Univ. Ithaca, N. Y.	
Pennsylvania	Mr. J. O. Pepper Prof. Ext. Entom. Pa. State Univ. State College, Pa.	
Rhode Island	Dr. F. L. Howard, Head Dept. Plant Path. & Entom. Univ. of R. I. Kingston, R. I.	Dr. Warren N. Stoner, Asst. Res. Prof., Plant Path. & Entom. Univ. of R. I. Kingston, R. I.

STATECLEARING HOUSESURVEY ENTOMOLOGIST

Vermont

Mr. John Scott, Director
Div. Plant Pest Control
State Dept. of Ag.
Montpelier, Vt.

Virginia

Dr. J. O. Rowell
Ext. Entomologist
Virginia Polytechnic Inst.
Blacksburg, Va.

Mr. Arthur P. Morris
Assoc. Ext. Entomologist
Virginia Polytechnic Inst.
Blacksburg, Va.

West Virginia

Dr. C. K. Dorsey
Prof. of Entom.
W. Va. Univ.
Morgantown, W. Va.

Mr. W. H. Gillespie
Survey Entomologist
State Dept. of Ag.
Charleston 5, W. Va.

**COOPERATIVE ECONOMIC
INSECT SURVEY**

• • •

PROGRAM ANNUAL REPORT

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**UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION**

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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION

ANNUAL PROGRAM REPORT

Cooperative Economic Insect Survey

July 1, 1956 - June 30, 1957

Cooperating Agencies:

State Departments of Agriculture
State Agricultural Extension Services and
State Agricultural Experiment Stations
Individuals and Industries in
The Eleven (11) Western States

October 30, 1957
Oakland, California

Jim R. Dutton
Regional Supervisor

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INTRODUCTORY

Statement of Problem

The Division, with the cooperation of all state agricultural agencies and other federal and private entomological workers, is endeavoring to establish a nationwide network of qualified people to observe current economic insect pest activity, to maintain constant vigilance for the detection of newly introduced economic insect pests of either foreign or domestic origin, and to report weekly to Washington, D. C. their findings.

Program Objectives

Provide each agricultural agency a better over-all picture of insect conditions in its state and nationally.

Assist farmers and others to more adequately protect their crops from insect attack.

Assure prompt detection of newly introduced insect pests.

Lead to the development of a workable insect pest forecasting service.

Aid manufacturers and suppliers of insecticides and control equipment to determine areas of urgent need.

In case of necessity, provide a country-wide skeleton structure to be expanded as needed to combat any attempt at biological warfare.

PROGRAM HISTORICAL INFORMATION

For many years the Insect Pest Survey reporting system functioned as a voluntary reporting service under the Division of Insect Detection and Identification, Bureau of Entomology and Plant Quarantine. In April 1951, in an effort to stimulate a lagging reporting system, the Chief of the Bureau of Entomology and Plant Quarantine invited the Experiment Station Director, the Extension Service Director, and the Director, Commissioner, or Secretary of Agriculture in each state to express himself regarding the expansion and reorganization of the insect reporting program. The response was very encouraging. As a result the Economic Insect Detection and Reporting Section was established with five regional offices located geographically to effectively maintain liaison

between the Washington Office and cooperating state officials and field workers. State clearing houses were established where insect information, received from qualified individuals throughout the state, was processed and released for state use, and, at the same time, forwarded to Washington to be compiled with other state reports into a national release for distribution to cooperators and industry. As the program developed, and as funds were made available to the Section, contracts were made with individual states to employ a Survey Entomologist on a cooperative basis.

During the 1957 fiscal year, nine of the eleven Western States had active agreements, with two states remaining to consider the plan but continuing to cooperate on a voluntary basis.

PROGRAM ACTIVITY DURING FISCAL YEAR

Planning and Direction

Every effort has been made to strengthen the survey program in all states where agreements were in force, and to encourage cooperative agreements with other states where practicable.

Arizona - Upon concurrence by the Extension Service, and the hiring of a full time entomologist, the Arizona agreement will, for the first time, be sponsored by the three state agricultural agencies.

Nevada - The Directors of the Experiment Station and the Extension Service have signed the agreement for the first time, and a full time Survey Entomologist was employed effective July 1, 1957.

New Mexico - Final arrangements were made during the year with New Mexico agricultural officials to enter into a cooperative survey agreement. Actual employment of a Survey Entomologist was not to be effected until sometime during the new fiscal year.

Utah - Since 1954, we have had a cooperative agreement in operation in Utah, sponsored by the Extension Service and with the services of a part time Survey Entomologist. We have been attempting to rewrite the agreement with all agricultural agencies in the state participating, and

with provision for the employment of a full time Survey Entomologist. The Utah agreement was cancelled June 30, 1957, because of failure to finalize these arrangements.

Washington - The Washington State agreement was rewritten and signed by the three state agricultural agencies, with the State Department of Agriculture participating in the program financially.

Wyoming - A new contract was being considered in Wyoming, where, for the first time, all three state agricultural agencies have indicated their desire to sign agreement as cooperators, the new sponsor to be the Extension Service.

Service surveys, such as potato psyllid and beet leafhopper, were conducted by Plant Pest Control Area Supervisors and other area personnel during the year.

Potato Psyllid Survey - This survey was conducted in the spring breeding areas in New Mexico, Arizona, and California. As the insect moves northward, surveys to determine presence and intensity are conducted on bi-weekly schedules during May and June in the States of Utah, Wyoming, and Colorado.

Beet Leafhopper Survey - In cooperation with Entomology Research Division, beet leafhopper surveys were made in the early spring breeding areas of New Mexico, Arizona, California, and Nevada. Along the Columbia River portions of Washington and Oregon, beet leafhopper survey areas were established by Division personnel working together with state officials of the two states and with the Entomology Research Division. Data derived will be disseminated as a reporting service to aid agriculture in the 1,000,000 acre irrigated area being developed in the Columbia Basin.

Recommendations During the Coming Year

Under the Plant Pest Control Division readjustment plan, area supervisors under the Regional Office assumed full responsibility for (1) the continuation of voluntary insect reporting within their states, (2) contacts with state agricultural officials, (3) maintenance of interest in the program and (4) stimulation of prompt and continued reporting of current insect conditions.

The integration of the numerous Plant Pest Control Division programs within the states has inadvertently de-emphasized the attention due the importance of the Insect Survey Program during the adjustment period. There is a need for better understanding of the cooperative Insect Survey Program by our Area Supervisors .

Technical Assistance

Invaluable assistance is rendered in each state by the entomology departments of state institutions, the Extension entomologists and state entomologists, the Experiment Stations, and by private and commercial entomologists. These co-operators offer unrestricted use of their insect collections and libraries for reference and comparison purposes. The results of daily observations on insect activities are voluntarily submitted by cooperators to state clearing offices.

The Cooperative Economic Survey program affords cooperators, and all interested parties, the following assistance:

- (1) Provides information about seasonal insect development as the growing season progresses from south to north.
- (2) Encourages the development of insect survey methods and improvement of surveys already in use.
- (3) Provides distribution maps of major economic insect pests.
- (4) Encourages the early detection of newly introduced pests by distributing printed information on such pests.
- (5) Maintains contact with entomological workers and interests them in being alert to the possibility of new pests being introduced.
- (6) Acquaints cooperators with lures, traps, and other detection devices which are to be employed in facilitating attainment of objectives.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

COOPERATIVE ECONOMIC INSECT SURVEY

Summary of Federal Expenditures, State Contributions, and Agreement Status
Period Ending June 30, 1957

Fiscal Year 1957

Region Western

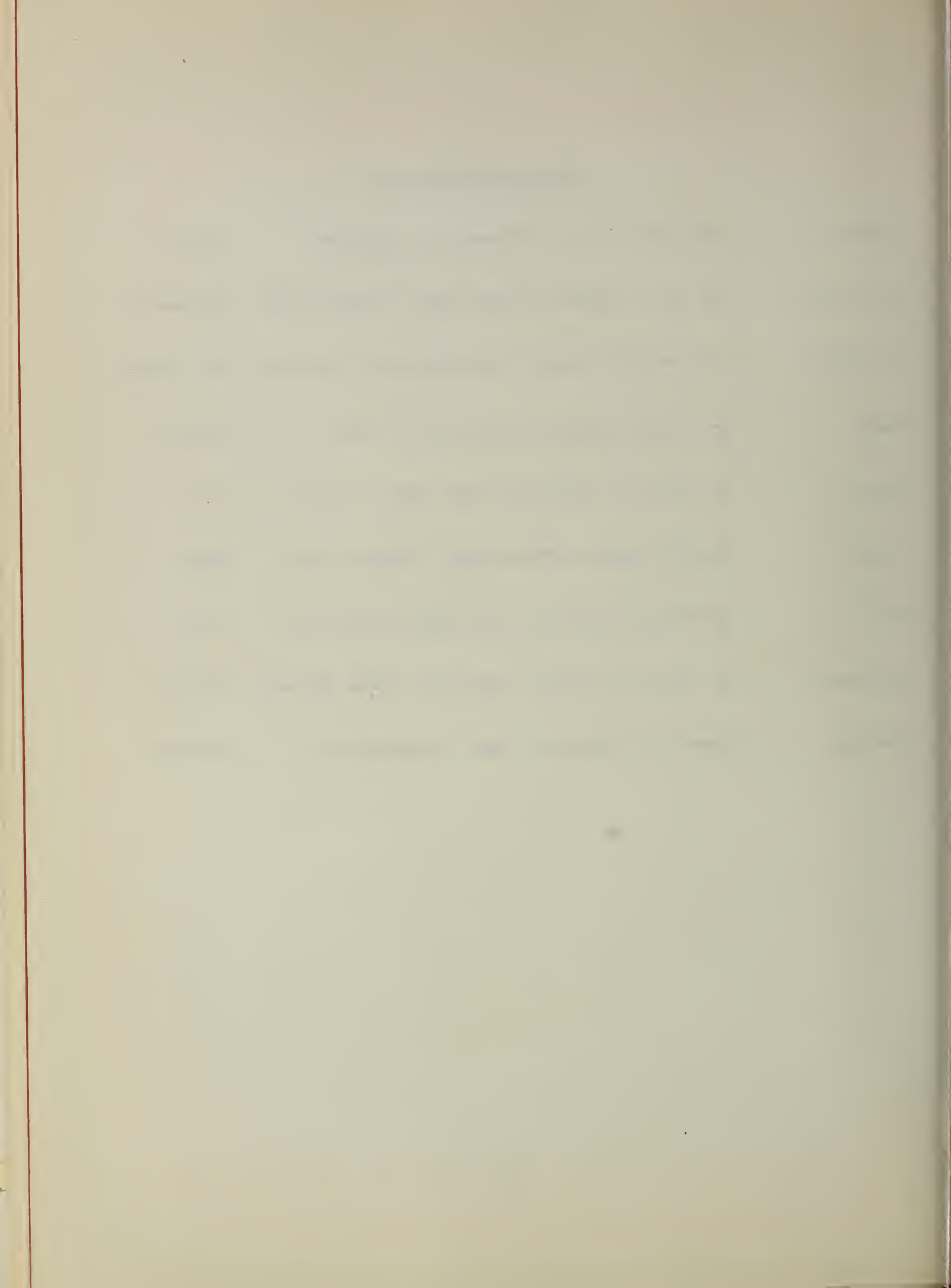
	Active Agreement	Pending Agreement	Rewriting Agreement	Period of Contract in Months	PPCD Expenditure 1957	Estimated Contri- bution by Sponsor- ing Agency toward Survey	Estimated Value by State Agencies toward Detection
Arizona	X	X	9	3,800.00	1,920.00	2,000.00	
California	X		12	5,000.00	1,250.00	120,000.00	
Colorado	X		8	2,700.00	3,773.00	6,400.00	
Idaho	X		6	2,250.00	2,219.00	8,000.00	
Montana							
Nevada	X	X	6	2,600.00	3,158.00	2,493.00	
New Mexico		X					
Oregon	X		12	3,590.00	no report		
Utah	X	X	9	3,500.00	7,569.69		
Washington	X		8	3,000.00	4,441.00	1,000.00	
Wyoming	X	X	7	1,540.00	no report		

State Clearing Offices
For Economic Insect Survey Reports

Arizona	Dr. L. A. Carruth, Head, Department of Entomology College of Agriculture, University of Arizona, Tucson
California	Mr. Robert W. Harper, Chief, Bureau of Entomology State Department of Agriculture, Sacramento
Colorado	Dr. Leslie B. Daniels, Head, Department of Entomology Colorado State University, Ft. Collins
Idaho	Dr. H. C. Manis, Head, Department of Entomology University of Idaho, Moscow
Montana	Mr. G. R. Roemhild, Asst. State Entomologist Department of Zoology and Entomology Montana State College, Bozeman
Nevada	Mr. Lee Burge, Director, Division of Plant Industry Nevada State Department of Agriculture, Reno
New Mexico	Mr. John J. Durkin, Extension Entomologist Plant Quarantine Service New Mexico College of A & M Arts, State College
Oregon	Mr. Frank McKennan, Chief, Division of Plant Industry Oregon Department of Agriculture, Salem
Utah	Dr. George F. Knowlton, Extension Entomologist Utah State University, Logan
Washington	Dr. Horace S. Telford, Chairman, Department of Entomology Washington State College, Pullman
Wyoming	Mr. Everett W. Spackman, State Entomologist Division of Entomology and Plant Industry Department of Agriculture, 308 Capitol Building, Cheyenne

Survey Entomologists

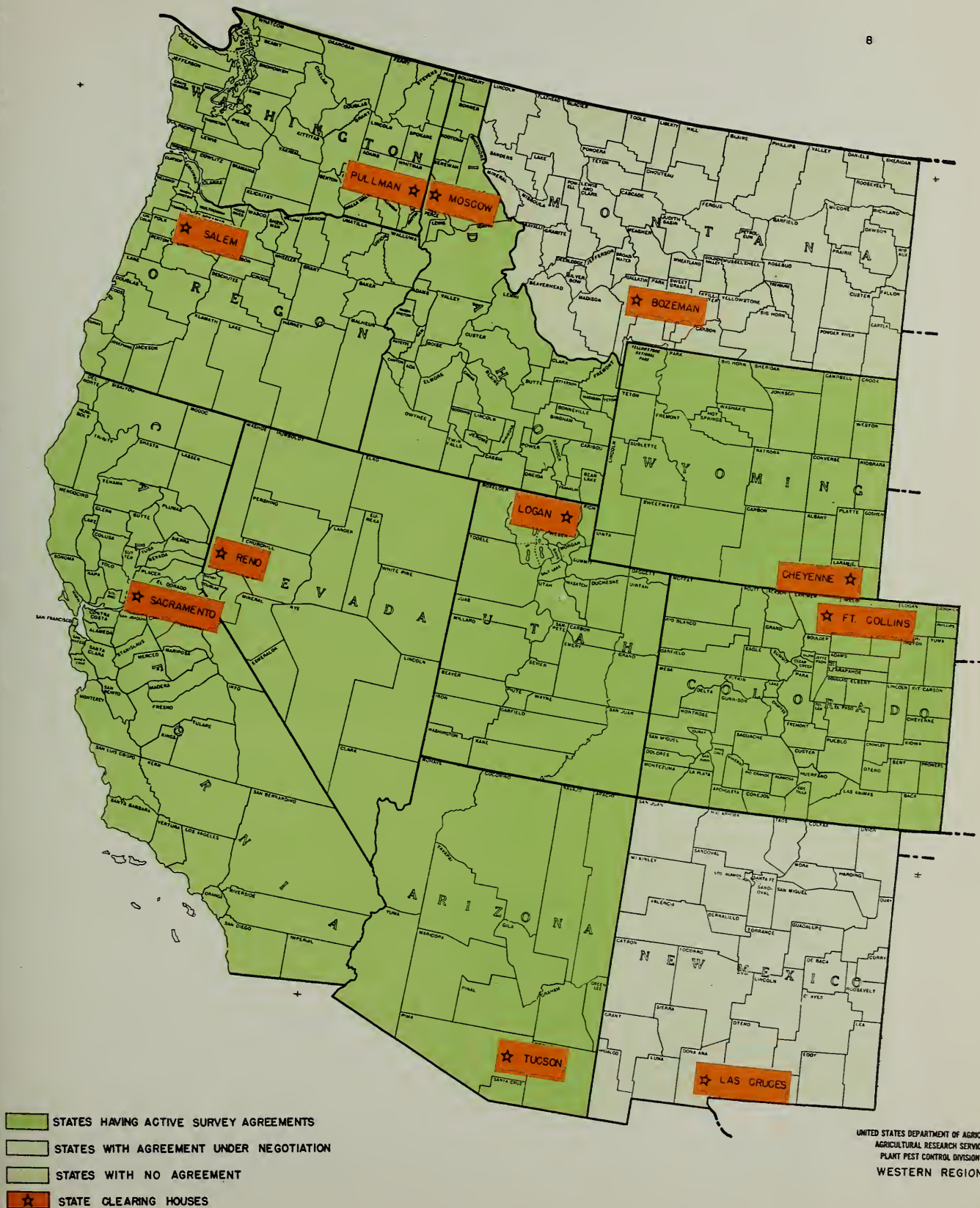
Arizona	Dr. Floyd Werner, University of Arizona	Tucson
California	Dr. H. T. Osborne, State Dept. of Agriculture	Sacramento
Colorado	Mr. Leonard Jenkins, Colorado State University	Ft. Collins
Idaho	Mr. Arthur Gittins, University of Idaho	Moscow
Nevada	Mr. Harry E. Gallaway, State Dept. of Agric.	Reno
Oregon	Mr. Joe Capizzi, State Dept. of Agriculture	Salem
Utah	Dr. George Knowlton, Utah State University	Logan
Washington	Mr. Ervin F. Dailey, Washington State College	Pullman
Wyoming	Everett W. Spackman, Dept. of Agriculture	Cheyenne



COOPERATIVE ECONOMIC INSECT SURVEY

AS OF JUNE 30, 1957

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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION

Revised

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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
EASTERN REGION

ANNUAL PROGRAM REPORT

EUROPEAN CHAFER

July 1, 1956 - June 30, 1957

COOPERATING AGENCIES:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
and
State Departments of Agriculture

December 1957
Moorestown, New Jersey

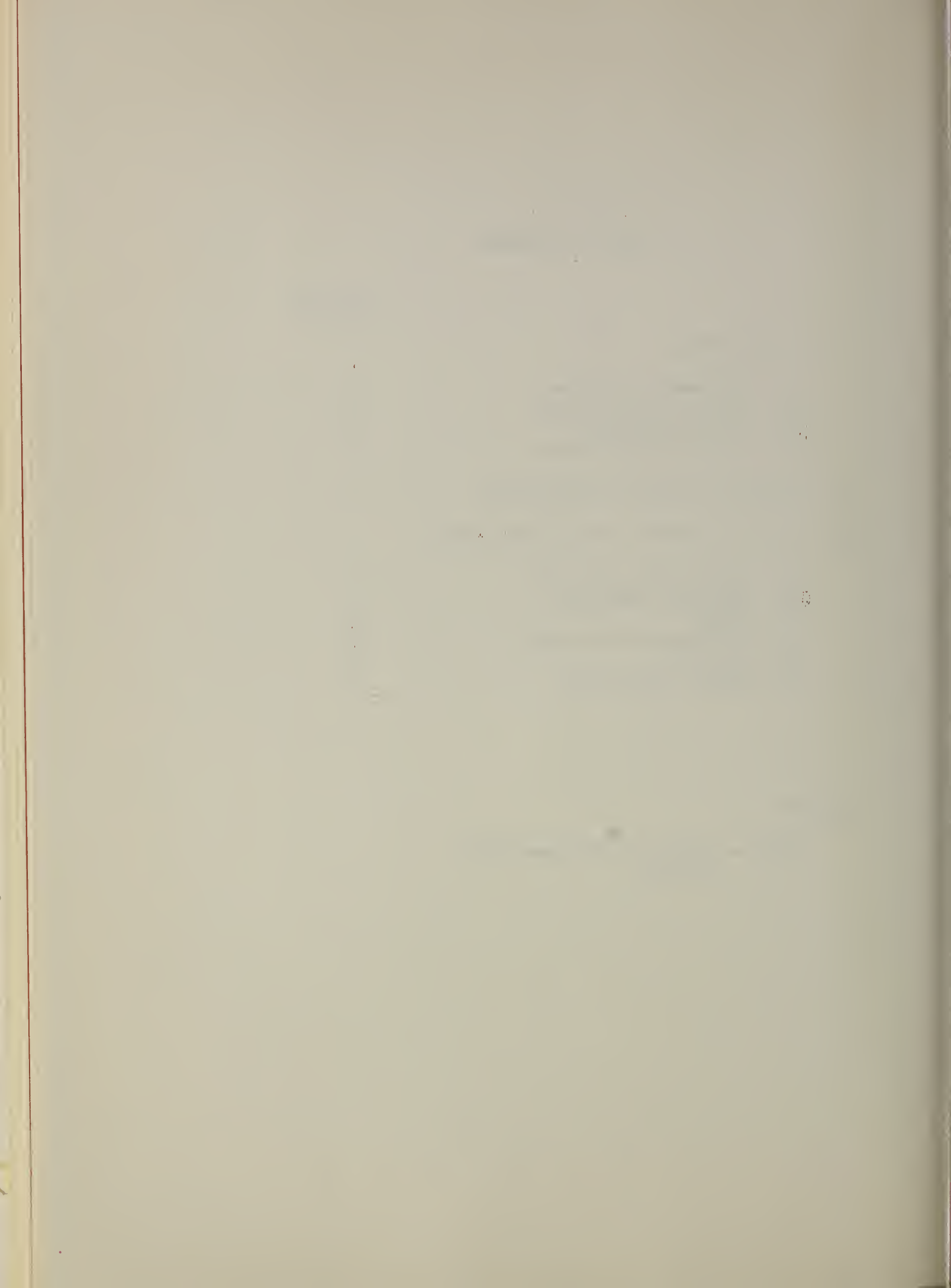
H. L. Smith
Regional Supervisor

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Appendix

Table - Summary of Regional Field
Activity



EUROPEAN CHAFER

1. INTRODUCTORY

A. Statement of Problem

Amphimallon majalis, Raz., a pest of economic importance to forage crops, winter grains and turf in parts of its native Europe, was first found in this country in Wayne County, New York in 1940. Since then injury by the chafer grub (the adult does little feeding) to local pastures, hay crops, small grains turf and other plantings in New York, and its potential destructiveness to agriculture elsewhere, has caused much concern to local, state and national agricultural interests. Work locations are mainly in New York where Federal-State quarantine regulations apply to a central area of about 1700 square miles in the vicinity of the discovery site, and in five isolated spot areas. One small local area is regulated in Connecticut, also one in West Virginia.

B. Program Justification

The potential destructiveness of this pest to small grains, legumes and grass areas in important non-infested parts of the United States can be prevented by effective quarantine enforcement and development of safe, effective, low-cost eradication or suppressive treatments in cooperation with State and Federal research and industry.

C. Program Objective

To prevent the spread of this pest to non-infested destinations, and assist in dissemination surveys and eradication treatments at incipient infestations. This is to be accomplished without undue interference with established production, marketing and transportation methods by regulated industry and affected individuals, and as economically as possible. There are plans for more effective program informational service to the public.

D. Status of Infestation

Now, there is general infestation of varying intensity in the vicinity of the discovery site, extending over about 1,000 square miles in parts of Wayne, Seneca, Ontario and Monroe Counties; also an area of less than 100 square miles in the Syracuse section, and spot infestations occur in Buffalo and Lockport, New York. There is also a small infestation near Meridan, Connecticut. No chafers have been found for two years in Hampshire County, West Virginia where a local infestation was discovered in 1954, and there were no collections this year at previously infested sites in Elmira, Oswego and Niagara Falls, New York. Dieldrin soil treatments had been applied for eradication in these four places.

II. Program Historical Information

As soon as the chafer demonstrated its destructiveness, the New York Department of Agriculture and Markets, the Agricultural Experiment Stations at Ithaca and Geneva, with cooperation by the research-regulatory units of the Federal Bureau of Entomology and Plant Quarantine and industry, began studies to develop information on its biology, means of detection, chemical and cultural controls, and regulatory measures for prevention of spread. Until September 1955, when the Federal Quarantine became effective, regulatory controls were enforced by the N. Y. State Department of Agriculture. The Federal-State quarantine regulations, applying also to one location each in Connecticut and West Virginia, control the movement to non-regulated destinations of soil, plants and other infestible articles. There has been considerable scouting in non-regulated areas and chemical eradication treatments applied at incipient infestations. Federal technical assistance, special equipment and some materials have been furnished to cooperating states applying such treatments.

III. Program Activity During Fiscal Year

A. Planning and Direction

The year-round regulatory activities involve numerous plant growing establishments, ranging from backyard gardeners to wholesale producers of ornamental and vegetable plants. The production and marketing of plants often is a complex business, requiring long-range financing, cultural, pest control and labor problems and competitive marketing. In order to have the necessary effective cooperation by the regulated industries they must have assurance that the needed methods of quarantine compliance are planned and administered by those with practical knowledge of their production and marketing problems; also that these requirements are flexible enough for adjustment to changing trade practices and pest risk hazards and that the regulations continue on a stable basis. Therefore, the representatives of industry are consulted, as well as state co-operators in planning methods of quarantine compliance necessary to assure non-infested states of reasonable protection. This planning which also involves survey and eradication work is one of the most important parts of the general program management by Regional and Area Supervisors. Overall direction of the work is by the Federal Plant Pest Division Area Supervisor.

However, his authority does not include allotments, use and accounting for State funds, or scheduling and supervising State inspectors. Direct supervision of field work is the responsibility of District Supervisors.

B. Technical Assistance

Entomologists and other scientists in Entomological Research Division, and in the N. Y. State Agricultural Experiment Stations in Geneva and Cornell carry on operational research in cooperation with the Federal and State regulatory workers and industry. Thus, safe, effective and low-cost methods of quarantine compliance and eradication are developed. The research workers have been continuing experiments to develop an effective trap, using various aromatics and trap devices. There is a special project with Cornell to do basic morphological studies as a basis for possible sex attractant material for traps. All of these activities are essential to all parts of the program and cooperative operational research is expected to be continued on the present satisfactory scale.

C. Survey

Survey in non-regulated areas was done in each section of New York, and in the vicinity of the Connecticut infestation, also where the chafer had been found in Hampshire County, West Virginia. Regulatory scouting was done in all regulated areas as a basis for quarantine compliance. Dissemination surveys are made to some extent in all states of this Region.

Because there is no practical trap for general use, and the fact that the adult flies only at dusk, and for only a few weeks, detection must be by field observation in the evening. This limits the scouting. All inspectors in this Region are alert for the possibility of chafer grub occurrence and they visit persons in charge of turfed areas, such as highway grass strips, golf courses, cemeteries, and parks, to have their workers alert for chafer grubs and to submit all observed "white grubs" for identification. All county agents are similarly informed. Picture sheets and information about chafer life history and habits are given wide distribution. Positive identification of chafer adults is difficult and is done by a field specialist trained at Cornell and in the Museum. All first record finds are sent to the Museum for check.

It is hoped that during the next few years an effective trap will be developed from the continuing tests with aromatics, or using sex attractants.

D. Eradication or Control

New York State has applied eradication treatments to all isolated chafer infestations, and such treatments have been made in Hampshire County, West Virginia. Connecticut has applied treatments in the Meriden area -- Dieldrin at 3 pounds per acre has been used in most areas -- with ground and air equipment. This is an effective treatment.

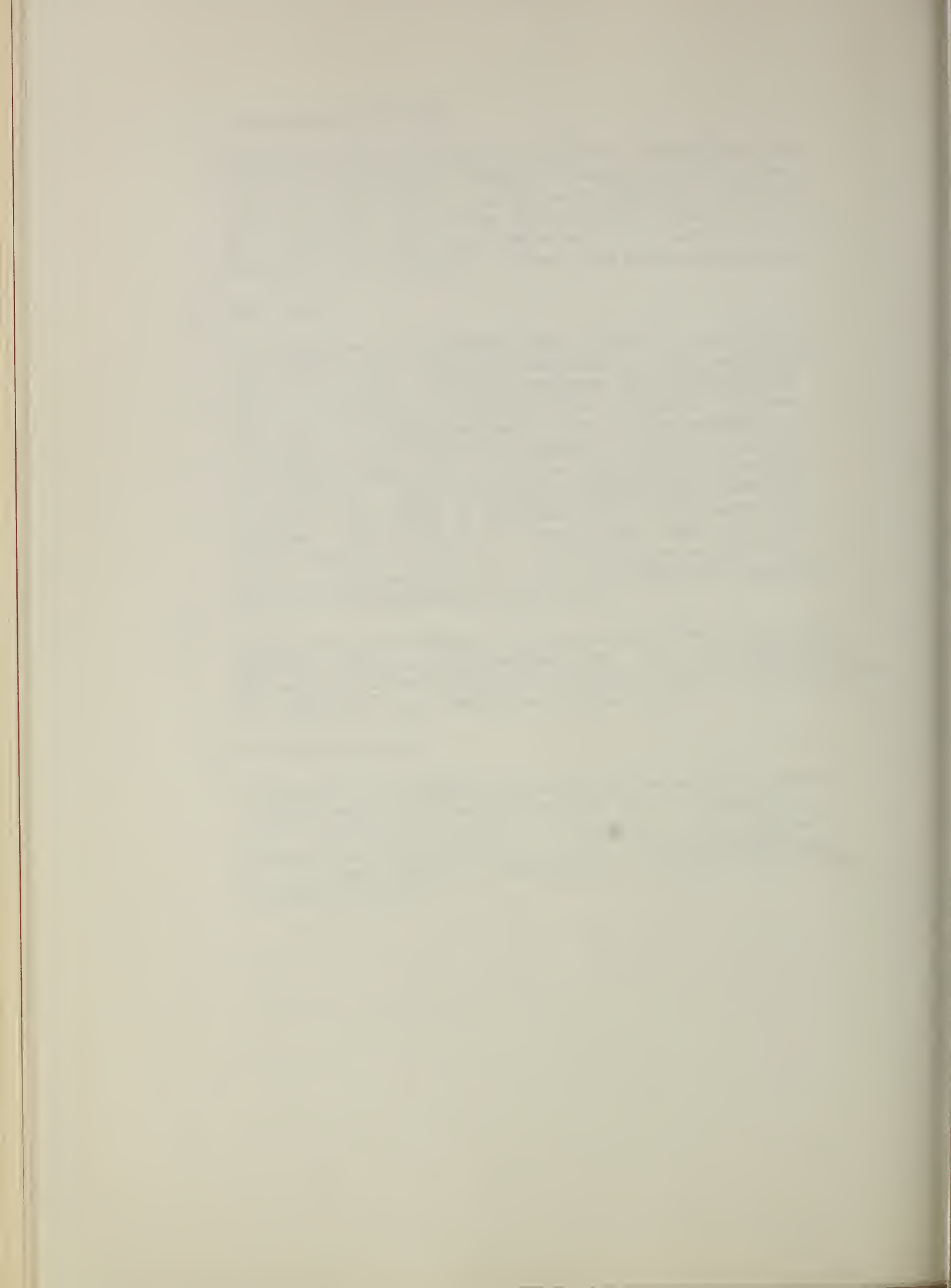
E. Regulatory

The objective is to prevent chafer spread by application of Federal-State quarantine regulation. Soil and plants are the principal articles regulated and certification may be granted by (1) negative field scouting, (2) inspection, or (3) by treatment. There is a selection of treatments which may be used during cultural period or at shipping time. These include fumigants and residual insecticides. The latter may be applied by wholesalers to field plots prior to planting and in many cases the treatment life extends to harvest time. Operational research should be continued indefinitely to be sure the certification methods keep pace with industry's advances and new insecticides and applicators.

During the year 350 plant growing establishments and soil, sand and gravel dealers had more than 1700 inspection service calls to certify regulated articles valued at \$30,000,000 for shipment to non-regulated destinations.

F. Methods Improvement

Cooperative State-Federal operational research to improve survey, control and regulatory work is a continuing project. Regulated industry also cooperates. All Regional personnel are instructed to be alert for improvements and to pass them promptly to supervisors -- thence to Methods Improvement Section.



Revised
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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

ANNUAL PROGRAM REPORT

GOLDEN NEMATODE CONTROL

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
New York State Department of Agriculture and Markets
Nematology Section, Horticultural Crops Research Division
Dept. of Plant Pathology, New York State College of Agric.,
Cornell University
and
State Departments of Agriculture

December 1957
Moorestown, New Jersey

H. L. Smith
Regional Supervisor

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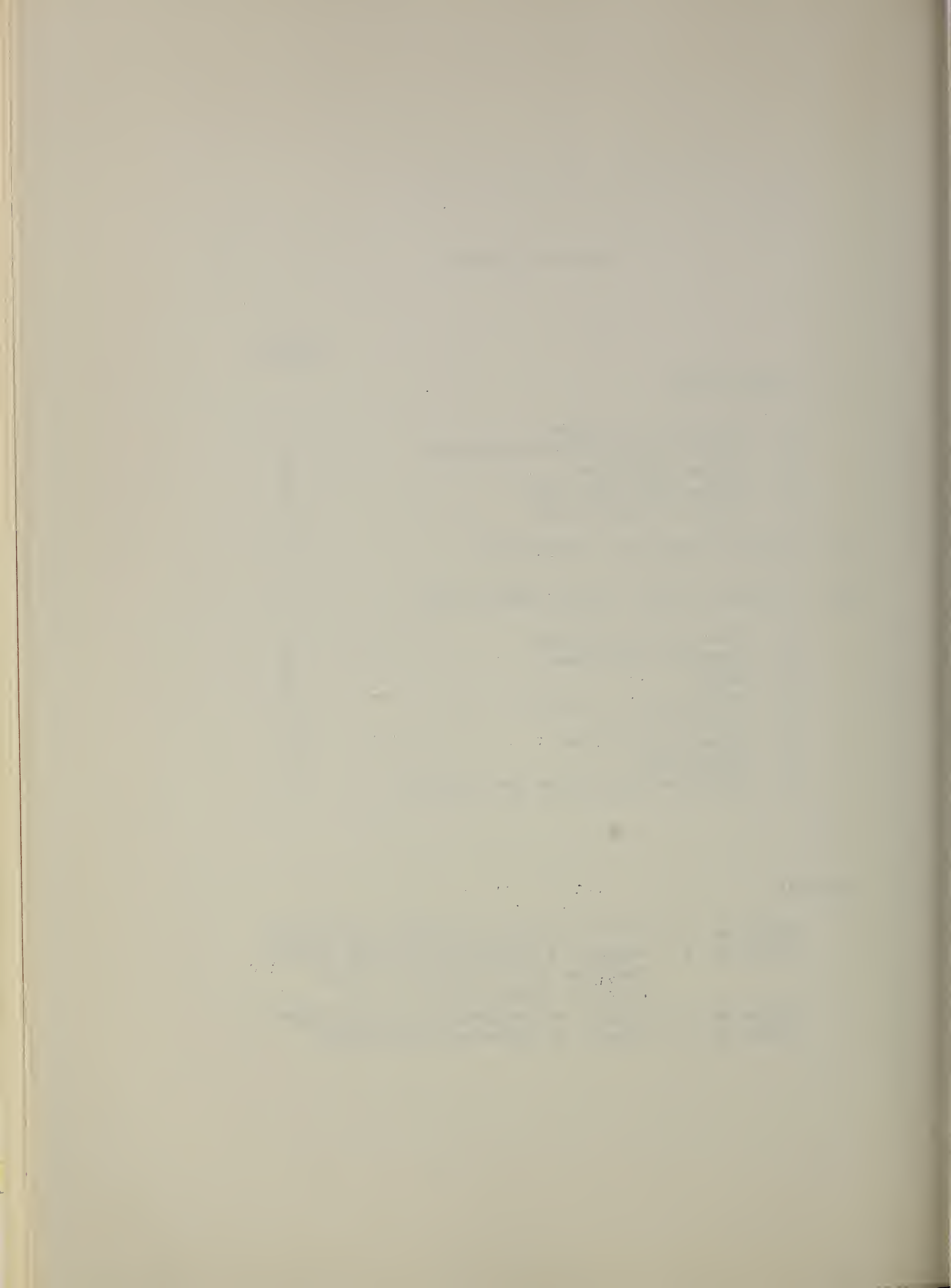
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- Table No. 1 - Status of Golden Nematode Infestation
- Table No. 2 - Summary of Properties on Long Island,
New York Found to Contain Golden
Nematode Infestation
- Table No. 3 - Summary of Regional Field Activities
- Table No. 5 - Summary of Associated Activities



I. INTRODUCTORY

A. Statement of Problem

The golden nematode, with high destructive potential and being well adapted to perpetuity, is a serious threat to the American potato industry. Being a microscopic soil inhabiting organism, it is easily carried to new locations where it may become established and become a source of further spread. The 1956 potato crop in our country was estimated at 243,238,000 hundred-weight which was produced on 1,390,900 acres at an average of almost 175 hundred-weight per acre. This yield and acreage may be reduced if we fail to control the golden nematode infestation on Long Island, New York. Uncontrolled infestations in other countries have resulted in general spread and in some instances total crop destruction.

B. Program Justification Statement

The lack of a practical means of eradicating this pest as well as the high value and wide spread use of potatoes makes it important that every means be taken to keep the golden nematode from spreading. This requires that surveys be made to locate infestations; that control measures be applied to reduce populations; and that regulatory actions be taken to prevent spread of the pest to new areas.

C. Program Objective

The program is designed to locate and prevent spread of the golden nematode; to reduce cyst population by removal of infested fields from host crop production; and to eliminate if possible cyst population on infested lands by chemical treatments. The objectives are accomplished by survey, control and regulatory measures.

D. Changes from Work Plan

Reorganization of the Division early in fiscal year 1957 precluded the immediate continuance of golden nematode surveys on a nationwide basis. Former plans to survey the 48 states on a three-year rotation cycle were abandoned until such time as a program could be developed which was in keeping with the new organizational pattern.

In addition the annual Spring survey of potato fields on Long Island was suspended for a period of six weeks during which time all available personnel in the Region were needed to assist in the endeavor to eradicate the gypsy moth.

E. Status of infestation

The confirmed acreage on Long Island as of June 30, 1957 is 13,146 acres; however, of this total 7,732 acres have been removed from agricultural use by real estate development. This leaves 5,414 acres of infested agricultural land under State Quarantine regulation. (Table No. 1) For the past three years there has been a marked reduction in the number of acres found infested. (Table No. 2)

II. PROGRAM HISTORICAL INFORMATION

The golden nematode Heterodera rostochiensis Wollenweber was not described until 1923 although it was known to exist in Germany as far back as 1881. Subsequent reports of its damage to potatoes in other countries eventually led to its recognition as a major pest of potatoes in Europe. A study of the history of spread of this pest in European nations should discourage an attitude of complacency on the part of other exposed countries. In Germany commercial crop damage was quite extensive by 1913 but regulatory measures were not put into effect until 1923. The disease history in England goes back perhaps to 1904 with new evidence of infestation being reported up to 1940 when practically all potato centers were known to have foci of infestation with many of the best lands becoming unproductive.

In the United States the golden nematode was identified in 1941 as the cause for commercial losses sustained from a potato field in Nassau County, Long Island, New York. Immediate steps to delimit the infestation were taken by the State Department of Agriculture and Markets with Federal nematologists of the Bureau of Plant Industry, Soils and Agricultural Engineering cooperating. By 1944 joint surveys had disclosed infestations on 1,238 acres and New York State had invoked regulatory measures designed to prevent spread of the nematode to other areas. Later the Federal Bureau of Entomology and Plant Quarantines was assigned as a cooperating agency for the purpose of expanding survey activities and aiding in the enforcement of regulatory measures. By 1946 the Bureau had adopted a soil sampling technique permitting greater coverage by annual surveys which, beginning in 1947 included potato producing centers in other states. Although isolated infestations outside the area of general infestation have been discovered on Long Island no established infestations have been disclosed elsewhere by the nationwide surveys. Specific authority for Federal participation in the golden nematode program is provided in Public Law No. 645 which was passed by the 80th Congress. State Quarantine regulations are revised and amended as new information becomes available and at the present time the program is operating under the provisions set forth in New York State Quarantine No. 10.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

In New York this program is a joint effort on the part of the New York Department of Agriculture and Markets and the Plant Pest Control Division with both organizations participating in the planning and direction. Program needs for the year were discussed and developed jointly at a meeting held early, in the year, in which cooperating research agencies and industry representatives also participated. Control and regulatory phases of the program were directed by the Area Supervisor and the Assistant Area Supervisor in charge of Long Island. Laboratory and survey phases were directed by the Regional Staff Assistant in charge of the Hicksville Laboratory. Surveys outside New York were planned with State plant pest officials concerned.

B. Technical Assistance

Research and related technical aspects of the program are conducted cooperatively by the New York State College of Agriculture, Cornell University; and the Nematology Section of the Horticultural Research Branch in laboratories located at Hicksville, New York, Ithaca; New York and Beltsville, Maryland. Technical assistance was furnished to regulated growers, shippers, carriers and to the public in connection with quarantine and control phases of the work; also to cooperators in connection with surveys.

C. Survey

The main objective of survey activities is to locate infestations so that regulatory or control measures may be applied to prevent spread of the pest. Subsequent surveys are made to delimit infestations and, still other inspections are made to determine the efficacy of soil treatments. These also supplement research data.

There have been no major changes in the survey and laboratory techniques as described in the 1954 edition of the Golden Nematode Handbook. Efficiency has been improved to a degree by narrowing and lengthening the area covered per sample but the basic survey pattern and the total area covered by each sample is the same. Increased efficiency in the laboratory has also resulted from the development of improved equipment. A new type container used by laboratory technicians in microscopic inspections was especially designed to provide guide lines which now assure complete coverage of material submitted for examination.

On Long Island, a total of 908 fields representing 28,856 acres was inspected. There were 45,215 soil samples collected from these fields. Laboratory processing of the samples revealed the presence of golden nematode cysts in eight (8) properties, all within the generally infested area of Nassau and western Suffolk Counties.

In addition to the work on Long Island there were 1,224 samples representative of 8,141 acres collected from 585 sites in the State of New Jersey. These samples were processed in the Hicksville laboratory with negative results. Table No. 3 is a statistical representation of accomplishments by area and category.

D. Eradication or Control

The basic golden nematode control program through the years has been to withhold infested land from potato production, thereby holding the cyst population on known infested fields to low levels. This has been accomplished by paying compensation to farmers annually for land being withheld. This year, payments amounting to \$28,537.80 were made by the State of New York to growers for withholding 476.63 acres of infested land from host crop production.

It has been recognized -however that such a control program may not always be feasible. Over a period of years research has shown that the soil fumigant D-D (dichloropropanedechloropropene) is a practical and effective nematocide against this pest, when applied to infested fields. Over 95% kill has been obtained by treating infested potato land at the rate of 450 lbs. of D-D per acre.

In 1955 a trial eradication program was initiated on one field with D-D used at the rate 900 lbs. per acre - in two equal treatments of 450 lbs. each, applied 10 days apart with the soil turned between treatments. Several weeks after treatment the field was intensively surveyed to determine effectiveness of the treatment and no viable cysts were found. A crop of potatoes was grown on this field in 1956. One viable cyst was found on a survey following the harvesting of this crop.

Intensive surveys of three fields treated in 1956 resulted in the recovery of 6 viable cysts in a small border section of one field. This field was retreated in 1957. Presently potatoes are being grown on four fumigated fields. These fields will remain in potato production unless viable cysts are found by surveys after each crop.

E. Regulatory

The Counties of Nassau and Suffolk on Long Island are under State quarantine. The New York State Golden Nematode Quarantine No. 10 regulates the movement of topsoil, sod, potatoes, root crops, grader debris, farm equipment and other articles likely to harbor nematode infestation.

Regulated topsoil, sod and grader debris is moved under permit to approved final destinations within the regulated area and New York City for landscaping purposes or disposal. Movement of these products to nurseries, greenhouses and agricultural land is prohibited. Movement of potatoes grown on infested fields is restricted to approved outlets in New York City, Yonkers, Mt. Vernon, and within the regulated area on Long Island for consumption therein. These must be packaged in paper containers and moved under permit. Potatoes grown on approved parts of infested fields may be moved without permit, when segregated from other potatoes and their identity is maintained, and packaged in paper bags or other approved containers. All root crops grown on regulated land must be washed free of soil and moved under permit. Movement of tomato plants grown on infested land is prohibited. Farm machinery, equipment, tools and other items that have been used on exposed or infested land requires steam cleaning or methyl-bromide fumigation before movement to other farms on Long Island or to other states. Such disinfecting services are provided by the New York State Department of Agriculture and Markets without cost to the farmer, contractor or shipper.

Potato movement and grader dirt disposal was supervised at 103 commercial grading stations operating under agreement. A total of 29,087 loads of regulated topsoil was moved under permit from 58 regulated locations. Approximately 657 pieces of contaminated farm machinery, vehicles, bulldozers and farm equipment; 36 lots of hand tools; 655 lengths of irrigation pipe; 148 rolls of snow fencing; and 1118 fence posts were steam cleaned. In addition, 3 tarpaulins, 1 sprayer, 1 potato combine and 1400 field burlap bags were fumigated with methyl-bromide. Thirty-two permits were issued under signed agreements to cover the movement of root crops from 45 fields.

F. Methods Improvement

On the trial field fumigation program, it is recognized that one of the major problems in eliminating cysts is in the top two inches of soil. In this top two inches, it is believed the gas tends to disseminate into the air more readily and is therefore less effective. An improved method was needed. Such a method was developed by the Beltsville Methods Improvement Section to effectuate complete turning of the soil when plowing.

The new method employs the use of rolling coulters and jointers attached to the plow and adjusting them in such a manner that they throw the top two inches of soil into the bottom of the preceding furrow. This improved method was used on fields which were soil fumigated this year.

G. Cooperation

Suppression and prevention of spread of the golden nematode is a joint undertaking of the New York State Department of Agriculture and Markets and the Plant Pest Control Division. Research phases of the work are conducted under cooperative agreement with the New York State College of Agriculture, Cornell University and the Nematology Section of the Horticultural Crops Research Division. The New York State College of Agriculture, Cornell University is very actively engaged in research phases of the golden nematode program both at the University and at a laboratory on Long Island. This research laboratory is jointly occupied by Cornell researchers and nematologists of the USDA Horticultural Crops Research Division. Cornell scientists stationed here devote full time to the golden nematode problem. The Federal nematologists expend part of their time on golden nematode research and the rest on other nematological problems of the area. Division personnel aid the research agencies by making population counts and viability checks when requested.

The Golden Nematode Project cooperates with all states in conducting surveys of their potato acreage in an effort to determine whether or not the nematode is present. State Entomologists, Pathologists or Nematologists and their technical staffs have been cooperative in giving their assistance in the conduct of these surveys. This backing has contributed substantially to the success of out-of-state inspections.

H. Associated Activities and Services

On several occasions this year information concerning the golden nematode was passed on to farm groups, plant boards and entomological societies by showing the movie film or presenting slide talks. Program personnel attended other gatherings for the purpose of hearing reports on current research developments of direct interest. In two instances staff members participated in Nematology workshops.

One major exhibit was displayed at an annual open-house sponsored by the New York State Agricultural School at Farmingdale. Activities at the exhibit included the showing of the Golden Nematode film, the projection of selected Kodachrome slides, microscopic demonstrations and the distribution of pertinent circulars and bulletins. Hundreds of farmers, nurserymen, agriculturists and other visitors attended the exhibit.

The Golden Nematode motion picture, The Handbook of Procedures, circulars and illustrated leaflets have been of tremendous benefit in presenting accurate information to numerous foreign visitors and in relaying information to State agencies who request such information from time to time.

A summary of associated activities is presented in Table 5.

TABLE NO. 1

STATUS OF GOLDEN NEMATODE INFESTATION

Long Island, New York

June 30, 1957

GROSS ACREAGE

CONFIRMED ACREAGE:

Nassau County	9,466.20	
Suffolk County	<u>3,680.59</u>	
Total Confirmed Acreage		13,146.79
Fully Developed for real estate as of June 30, 1957		<u>7,732.51</u>
Remaining Confirmed Acreage Available to Agriculture		5,414.28

CLASSIFICATION OF ACREAGE AVAILABLE TO AGRICULTURE

Quarantine "A" land:*

Nassau County	1,145.80	
Suffolk County	<u>1,570.13</u>	
Total "A" land		2,715.93

Quarantine "B" land:**

Nassau County	1,022.57	
Suffolk County	<u>1,675.78</u>	
Total "B" land		2,698.35

Remaining confirmed acreage as above		5,414.28
--------------------------------------	--	----------

*"A" Land -- that portion of an infested field on which nematode cysts have been found.

**"B" Land -- approved parts of infested fields on which no infestation has been found.

TABLE NO. 2

SUMMARY OF PROPERTIES AND ACREAGE ON LONG ISLAND, N.Y. FOUND TO
CONTAIN GOLDEN NEMATODE INFESTATION
JUNE 30, 1957

YEAR	<u>NASSAU COUNTY</u>		<u>SUFFOLK COUNTY</u>		<u>TOTALS</u>	
	NO. OF PROPERTIES	NO. OF ACRES	NO. OF PROPERTIES	NO. OF ACRES	NO. OF PROPERTIES	NO. OF ACRES
1941	2	115.66			2	115.66
1942	9	541.86			9	541.86
1943	8	437.36			8	437.36
1944	5	142.98			5	142.98
1945	5	165.88			5	165.88
1946	41	1,656.50			41	1,656.50
1947	52	2,793.28	1	30.00	53	2,823.28
1948	27	1,034.66	6	216.95	33	1,251.61
1949	22	663.00	7	350.15	29	1,013.15
1950	22	660.56	6	232.88	28	893.44
1951	16	544.75	10	302.80	26	847.55
1952	13	261.12	12	790.61	25	1,051.73
1953	8	167.43	19	989.20	27	1,156.63
1954	3	143.24	5	266.00	8	409.24
1955	2	130.00	3	85.30	5	215.30
1956			3	153.00	3	153.00
1957	1	7.92	7	263.70	8	271.62
Total	236	9,466.20	79	3,650.59	315	13,146.79

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

EASTERN REGION

GOLDEN NEMATODE

FISCAL YEAR 1957

SUMMARY OF REGIONAL FIELD ACTIVITIES

ACRES SURVEYED	Acres Field Surveyed	Grader Survey		Infestations		Topsoil Movement		Number of Inspection Calls	Remarks
		Number Sites	Acres Represented	Number Properties	Number Acres	Pits Operating	Loads Moved		
Long Island Nassau County Suffolk County F.Y. 1957	2,874 25,982 28,856			1 7 8	9 est. 288 est. 297 est.	48 11 59	10,458 1,643 12,101	1,281*** 1,281***	***No record of inspection calls kept before January 1, 1957
Total Period 1944 to June 30, 1957	479,100*			315	13,147				* Represents repeated surveys L.I. area
Other areas by States - F.Y. 1957 New Jersey	151	572	7,990						
Total F.Y. 1957 Other Areas Only	151	572	7,990	0	0				
Total Period 1944 to June 30, 1957 Other Areas Only	ALL STATES		2,015,409**	0	0				** Repeated grader and field surveys 48 states

TABLE NO. 5

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

Program Golden NematodeRegion Eastern

SUMMARY OF ASSOCIATED ACTIVITIES

Fiscal Year 1957

Area	Public Meetings Attended	P r e s e n t a t i o n s					Feature & News Stories*	Extent These Aids Were Used**			Special Reports
		Talks	Slides	Films	Radio	TV		Exhibits	Bul.*	Cir.*	
New York	6	2	2	5			1	30	30	5	
Eastern Region	2	1	1	1				20	20	20	50
National	1	1	1					20	20	40	40
International								20	20		30
Total	9	4	4	6			1	90	90	65	120

* Written by Federal personnel for release direct or through cooperators.

** This should be a conservative estimate (accurate record for these items impractical).



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
CENTRAL REGION

ANNUAL PROGRAM REPORT

GRASSHOPPER CONTROL

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
In cooperation with
State, County, and Local Agencies

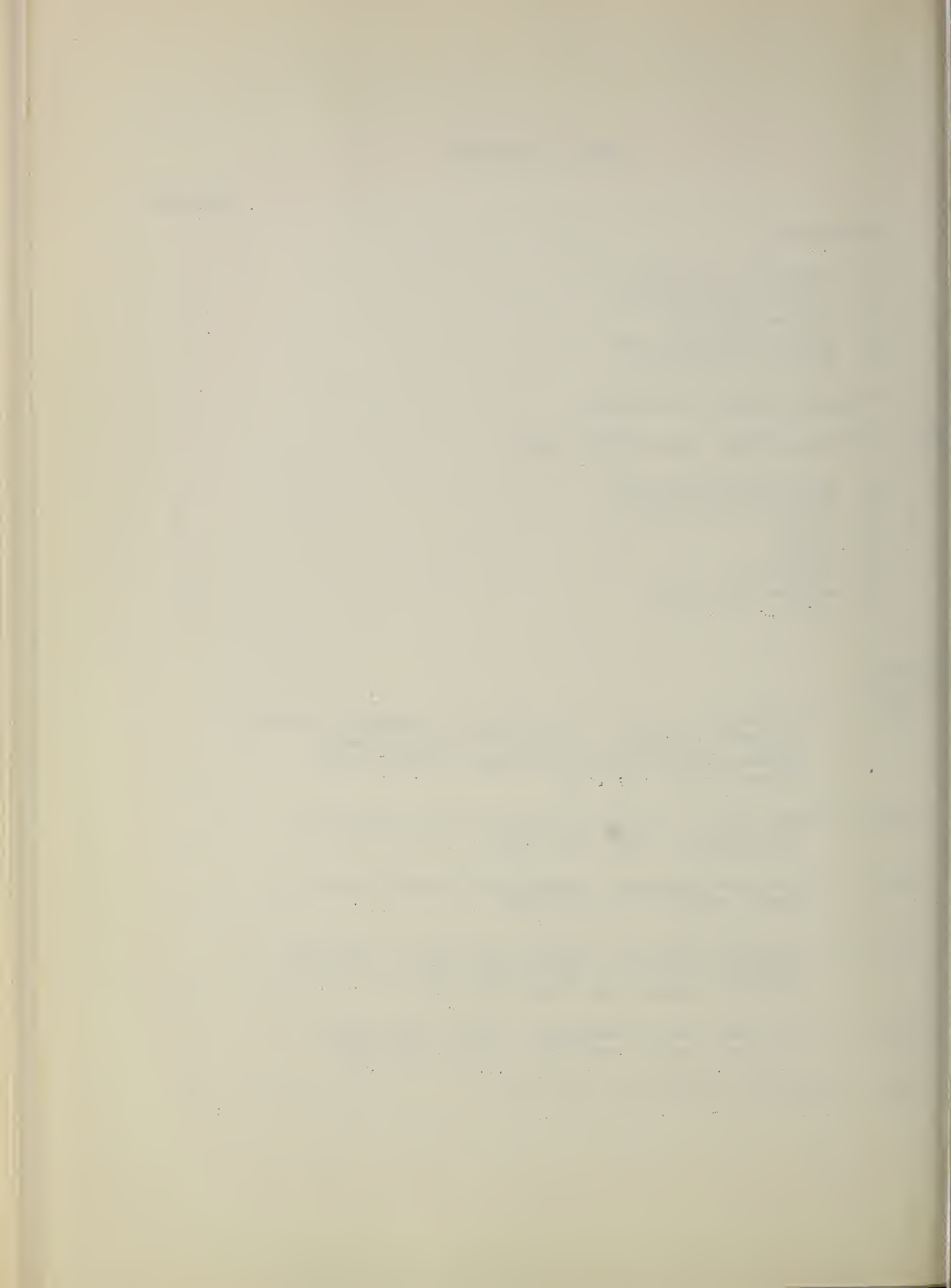
October 21, 1957
Minneapolis, Minn.

R. O. Bulger
Regional Supervisor



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I. INTRODUCTORY

A. Statement of Problem

Grasshoppers are a threat to food, fiber, and forage crops in some part of the Central Plant Pest Control Region each year. They are capable of causing severe damage and, unless adequate control measures are taken when needed, they sometimes completely destroy grain, hay, pastures, and range forage. Rangeland species are a problem in an area extending through the western parts of Kansas, Nebraska, South Dakota, and North Dakota. In 1956, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, South Dakota, and Wisconsin reported a crop loss of \$20,903,600 due to grasshoppers. Losses in 1957 were not so great because of an abundance of moisture this past spring, which broke the drought cycle. (Table 1.)

B. Program Justification Statement

The suppression of grasshopper populations and the holding of losses to a minimum are two main objectives which justify the cooperative grasshopper control program. If left uncontrolled, infestations of grasshoppers in crops or on rangeland could become so widespread that it would be beyond the scope of the individual or state to control them. Infestations which occur on valuable rangeland are many times of sufficient density to cause severe competition between the grasshoppers, livestock, and wildlife. Control work is then justified to protect the forage on infested range, prevent the spread of grasshoppers to additional range or cropland, minimize the threat of livestock dislocation, and avoid serious erosion consequences.

C. Program Objective

1. The long-term objective of grasshopper control is to acquaint interested individuals, agricultural groups, and State and Federal officials with the recurrent nature of the problem and the methods of controlling this insect pest.
2. The immediate objective is the organization of cooperative control programs, where needed, in range areas, and the furnishing of technical assistance in crop areas.

D. Changes from Work Plan

None.

E. Status of Infestation

Cooperatively conducted grasshopper surveys made during the late summer of 1956 in the Central Plant Pest Control Region revealed that 3,906,000 acres of rangeland in Kansas, Missouri, Nebraska

North Dakota, and South Dakota might require grasshopper control in 1957. Cool, wet weather, however, did much to retard range grasshopper development in Kansas, Missouri, and South Dakota. Farmers in parts of the 13 states in this region, and particularly in Kansas, Nebraska, and North Dakota, found it necessary to initiate control action against cropland grasshoppers.

II. PROGRAM HISTORICAL INFORMATION

Grasshoppers are at times a serious problem to range forage and cultivated crops. The most recent serious outbreak occurred in the 1930's, during the period of extreme drought. Since that time, they have each year caused from light to severe damage in localized areas. During the past three years populations of this insect increased in range- and cropland areas, particularly in Kansas, Missouri, Nebraska, Iowa, South Dakota, and North Dakota. The early hatching of crop species in North Dakota this spring gave evidence of one of the worst infestations in many years. A total of 111,000 acres of privately-owned range in Kansas was treated in 1956, as were several small acreages of Federally-owned land in Missouri, North Dakota, and South Dakota.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

Adult crop and rangeland grasshopper surveys made during July, August, and September indicate the localities in which grasshoppers might be troublesome the next season. With the survey data obtained, area supervisors consult with cooperators and make plans for local meetings in those areas which might need cooperatively financed or voluntary grasshopper control programs. The direction of cooperatively financed control programs is by Division personnel.

B. Technical Assistance

1. Assistance given by research workers, Extension entomologists, and State entomologists has been of great value. Research workers furnish the latest information on control methods and insecticides to be used. The Extension workers and State entomologists and their staffs participate in educational activities, meetings, surveys, and control programs.
2. Division personnel, with the help of cooperators, contact many farmers, ranchers, county agents, commercial spray operators, and others, either individually or at scheduled meetings. They provide them with information about grasshopper infestations, inform them of the precautions to be taken when using insecticides, plan the establishment of cooperative control programs in range areas, and give technical assistance to farmers in cropland areas. Many times they are called upon to make personal radio or television appearances or to help write

newspaper items and letters relating to grasshopper problems. They direct the various grasshopper surveys and provide cooperators with a summary of the data obtained. Occasionally they assist research workers with experimental plots in connection with cooperative range grasshopper control. Chemical and insecticide formulators and dealers are in touch with Division personnel, both in the field and in the Regional office. These people are interested in knowing about grasshopper development in the region and the chemicals which might be used in control programs. They supply the Division offices with information about the chemicals.

C. Survey

1. Objective - To find and delimit infestations of grasshoppers, determine the density of populations, and evaluate effectiveness of control measures.
2. Procedures - Field surveys help accomplish the objectives mentioned. These normally are the nymphal, adult, and egg surveys. Pre- and post-control surveys are made in areas where control programs are established.
3. Accomplishments - Adult grasshopper surveys are conducted in parts of or in all the states in this Region, except Kentucky.

D. Control

1. Objective - To control locally severe infestations of grasshoppers and prevent any widespread build-up with a danger of migrations to new areas.
2. Procedures - Aircraft are used to apply insecticides in a cooperative rangeland grasshopper-control program. Contracts are let for both the aircraft and the insecticide. The insecticide used is either aldrin or heptachlor, at the rate of 2 to 3 ounces of the insecticide per gallon of diesel fuel per acre. Ground sprayers are used on small acreages or in areas not readily accessible to planes. Both types of equipment are also used in voluntary grasshopper control.
3. Accomplishments

a. Cooperatively financed rangeland grasshopper control

Cooperative private rangeland grasshopper control is financed on a one-third, one-third, one-third basis, with the Plant Pest Control Division contributing one-third of the cost and cooperators the other two-thirds. On public domain the Government--with the financial assistance of the land-managing agency, whenever possible--pays the full cost of the control work. During the fiscal year 1957, states, counties, and landowners in four states contributed \$38,649.96 to cooperative rangeland

grasshopper control programs. Other cooperating Federal agencies contributed \$332.74. The Plant Pest Control Division spent \$26,611.52 chargeable to contingency funds. The total cost of all of the cooperative rangeland grasshopper control programs was \$65,594.22. (Table 5.)

A total of 129,687 acres of rangeland in four states was treated for the control of grasshoppers in fiscal year 1957. Of this, 14,770 acres was Federal land--12,050 acres belonging to the U. S. Department of Agriculture (Forest Service) and 2,720 acres to the U. S. Department of Interior (Fish and Wildlife Service). See tables 2 and 3.

b. Voluntary grasshopper control

Farmers in cropland areas finance their own grasshopper control programs. Such programs are classed as voluntary control. The states of North Dakota and Iowa, however, did make State funds available to control grasshoppers in roadside margins when farmers controlled them in their fields. North Dakota appropriated \$200,000 for the next biennium and reimbursed each farmer the sum of 10 cents per acre, if he certified that he had actually done grasshopper control on his own farm. Iowa, in 1956, appropriated \$45,000 to assist farmers in that state by spraying roadside margins.

Reports from State cooperators indicate that an estimated 4,685,776 acres of cropland were voluntarily treated for grasshopper control in 11 states of the Central Region. Aldrin, toxaphene, heptachlor, and dieldrin were the insecticides most commonly used in the voluntary control programs. (Table 4.)

E. Regulatory

None.

F. Methods Improvement

None.

G. Other

1. Cooperation received during the reporting year - The states of Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin all contributed in one or more ways to the program. Such cooperation included cash and/or equivalent aid and intangible services. It is estimated that this aid amounted to \$182,792.

2. Funds spent

a. Federal funds

For planning and direction, technical assistance, surveys, control, and other activities, the Plant Pest Control Division spent \$77,600.

b. Contributed funds

Other organizations such as State Departments of Agriculture, Experiment Stations, etc., contributed services amounting to \$93,475.

3. Associated activities and services

a. Program servicing

(1) Meetings, visual aids, etc.

Federal personnel participated in 96 public meetings, presented 88 talks, and made 3 film showings. They furnished materials and assisted in placing 43 exhibits and distributing 5,030 bulletins and 400 infestation maps. Cooperators held 282 public meetings, presented 274 talks, made 42 film presentations, and appeared 32 times each on the radio and television. They also wrote 102 feature and news stories, placed 3 exhibits, and distributed 1,700 bulletins and 10,400 infestation maps. (Table 6.)

(2) Recommendations

No specific recommendations.

Table 1. - Voluntary and Cooperatively Financed Grasshopper Control Programs, Estimates of Acres Protected, Loss in Dollars, and Savings in Dollars, As Reported by States - Fiscal Year 1957

State	Voluntary Control			Cooperatively Financed Control		
	Acres Protected	Loss Caused (Dollars)	Savings from Control (Dollars)	Acres Protected	Loss Caused (Dollars)	Savings from Control (Dollars)
Indiana	20,000	-	100,000	-	-	-
Iowa	1,507,317	*	*	-	-	-
Kansas	908,552	2,475,000	2,518,700	90,000	75,000	55,000
Michigan	25,000	200,000	60,000	-	-	-
Minnesota	142,939	1,831,200	820,472	-	-	-
Missouri	1,000,000	10,000,000	7,500,000	4,100	4,000	20,500
Nebraska	630,000	5,187,000	11,356,000	-	-	-
North Dakota	739,620	*	*	1,500	2,300	3,800
Ohio	1,000	10,000	15,000	-	-	-
South Dakota	175,000	600,000	350,000	10,000	25,000	35,000
Wisconsin	30,000	600,000	5,000	-	-	-
Totals	5,179,428	20,903,600	22,725,372	105,600	106,300	114,300

*Reports did not include this information.

Table 2. - Total Acres of Rangeland Treated for the Control of Grasshoppers - Fiscal Year 1957

State	Private and State Lands (Acres)	Federal Lands (Acres)	Total Acreage
Kansas*	111,049	-	111,049
Missouri	-	1,760	1,760
North Dakota	2,474	7,810	10,284
South Dakota	<u>1,394</u>	<u>5,200</u>	<u>6,594</u>
Totals	114,917	14,770	129,687

*This control program was started in fiscal year 1956 and completed in fiscal year 1957.

* * * * *

Table 3. - Cooperative Rangeland Grasshopper Control - Fiscal Year 1957.
Federal Land Ownership

State	Area	Period of Control Operations	Land Ownership (Acres)	USDI	USDA	Fish & Wildlife Service	Total Acres
Missouri	Chariton Co. - Swan Lake Refuge	7/9-13/56	800	-			
	Holt Co. - Squaw Creek Refuge	7/15-9/15/56	<u>960</u>	-			
Subtotals			<u>1,760</u>	-			<u>1,760</u>
North Dakota	Bottineau and McHenry Cos. - Lower Souris Refuge	7/26-8/6/56	960	-			
	Golden Valley Co. - LU Land	7/1-5/57	-		<u>6,850</u>		
Subtotals			<u>960</u>		<u>6,850</u>		<u>7,810</u>
South Dakota	Custer-Pennington Cos. - (Black Hills, N.F.)	7/9-30/56	-		<u>5,200</u>		
Subtotals			-		<u>5,200</u>		<u>5,200</u>
GRAND TOTALS			2,720	12,050			14,770

Table 4. - Voluntary Grasshopper Control Operations - Estimated Acreage Treated, and Insecticides Used,
As Reported by State Cooperators - Fiscal Year 1957

State	Acres	Insecticide	Form Used
Indiana	20,000	Aldrin, Toxaphene, Heptachlor	Spray
Iowa	1,587,317	Aldrin, Dieldrin, Heptachlor, Chlordane, Toxaphene, Malathion, Benzene Hexachloride	Spray
Kansas	597,000	Aldrin, Dieldrin, Heptachlor	Spray and bait
Michigan	12,000	Aldrin, Toxaphene, Heptachlor, Chlordane, Dieldrin, Sodium fluosilicate	Spray and bait
Minnesota	142,939	Aldrin, Toxaphene, Heptachlor, Chlordane, Dieldrin	Spray, dust, and bait
Missouri	750,000	Aldrin, Heptachlor, Dieldrin	Spray
Nebraska	630,900	Aldrin, Toxaphene, Heptachlor, Dieldrin	Spray
North Dakota	739,620	Aldrin, Toxaphene, Heptachlor, Dieldrin	Spray
Ohio	1,000	Aldrin, Toxaphene, Dieldrin	Spray
South Dakota	175,000	Aldrin, Toxaphene, Heptachlor, Chlordane, Dieldrin	Spray
Wisconsin	30,000	Aldrin, Toxaphene, Heptachlor, Dieldrin	Spray
Total	4,685,776		

Table 5. - Cooperative Range Grasshopper Control Operations. Acreages Sprayed, and Costs -
Fiscal Year 1957

State and Location	Period of Control Operations	Acreage Sprayed	Total Acres Treated	Costs					Total Cost	Av. Cost Per Acre
				Contract : Aircraft	Ground : Equipment	States, Counties, & Landowners	Other Co-operating : Fed. Agcs. : Division :	Plant Pest : Control :		
Kansas - Barber, Commanche, and Kiowa Counties	6/19-7/10/56	111,042	-	111,042	\$36,244.85	-	\$18,122.43	\$54,367.28	\$0.49	
Totals		111,049	-	111,049	\$36,244.85	-	\$18,122.43	\$54,367.28		
Missouri - Chariton Co. (Swan Lake Wildlife Refuge)	7/9-7/13/56	-	800	800	-	-	-	-		
Holt Co. (Squaw Creek Wildlife Refuge)	7/15-9/15/56	-	960	960	-	\$186.50	\$ 457.85	\$ 644.35	.37	
Totals		-	1,760	1,760	-	\$186.50	\$ 457.85	\$ 644.35		
North Dakota - Bottineau & McHenry Cos. (Lower Souris Wildlife Refuge)	7/26-8/6/56	-	960	960	-	\$146.24	\$ 96.00	\$ 242.24	.25	
Golden Valley Co.	7/1-7/5/57	9,324	-	9,324	\$1,889.44	-	\$ 6,875.12	\$ 8,764.56	.94	
Totals		9,324	960	10,284	\$ 1,889.44	\$146.24	\$ 6,971.12	\$ 9,006.80		
South Dakota - Custer and Pennington Cos.	7/9-7/30/56	-	6,594	\$ 6,594	\$ 515.67	-	\$ 1,060.12	\$ 1,575.79	.24	
Totals		-	6,594	6,594	\$ 515.67	-	\$ 1,060.12	\$ 1,575.79		
GRAND TOTALS		120,373	9,314	129,687	\$38,649.96	\$332.74	\$26,611.52	\$65,594.22		

Table 6. - Summary of Associated Activities - Fiscal Year 1957

States	: Public :	Presentations	: Feature :	Extent These Aids Were Used**	: Special Reports
	: Meetings :	: Talks: Slides: Films: Radio: TV :	: & News :	: Bulle--: Circu--: Infest. Maps :	: Reports
	: Attended:	Talks: Slides: Films: Radio: TV	: Stories*: Exhibits: tins* :	: larg*: and Posters :	
<u>FEDERAL</u>					
Iowa	-	-	-	10	2
Kans.	3	-	-	-	-
Minn.	59	-	-	1	-
Mo.	-	-	-	10	2
Nebr.	10	-	-	-	-
N. Dak.	17	-	-	1,000	-
S. Dak.	7	-	-	4,000	-
Wis.	-	-	-	10	-
Subtotals	96	88	43	5,030	4
<u>COOPERATORS</u>					
Iowa	25	25	10	1,000	2
Minn.	-	-	-	-	-
Mo.	10	10	4	400	2
Nebr.	47	47	3	-	-
N. Dak.	175	170	-	200	-
S. Dak.	25	22	-	100	-
Wis.	-	-	85	-	-
Subtotals	282	274	102	1,700	1
Grand Totals	378	362	46	6,730	9

*Written by Federal personnel for release direct or through cooperators.

**Conservative estimate.

Cooperative Aid Received - Fiscal Year 1957

State	Cash and Equivalent Aid*			Total of		Intangible		Source	
	Cash	Personal Services	Equipment & Supplies	Cash & Equiv.*	Space	Service	Estimate**	Grand Total	
Illinois	0	900	0	900	0	0	0	900	
Iowa	0	0	45,000	45,000	0	20,600		65,600	
Kansas	0	0	0	0	0	1,400		1,400	
Minnesota	0	0	0	630		31,975		32,605	
Missouri	0	1,187	0	1,187	0	500		1,687	
Nebraska	0	0	0	0	0	2,100		2,100	
North Dakota	40,000	0	0	40,000	0	27,500		67,500	
South Dakota	0	0	0	0	0	6,500		6,500	
Wisconsin	0	1,600	0	1,600	0	2,900		4,500	
Totals	40,000	3,687	45,000	89,317	630	93,475		182,792	

*Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

**Limited to services incidental to other activities for which only an estimated value is available.

Expenditures by Source and by Activity - Fiscal Year 1957

State	Planning & Direction	Technical Assistance	Survey	Control	Regulatory	Improvements	Other	Total
<u>CASH & EQUIVALENT*</u>								
Plant Pest Control Division	\$ 5,000.00	\$ 7,600.00	\$61,000.00	\$ 2,000.00	-	\$ -	\$2,000.00	\$ 77,600.00
Other Organizations:								
Ill.	-	-	900.00	-	-	-	-	900.00
Iowa	-	-	-	45,000.00	-	-	-	45,000.00
Minn.	-	-	-	-	-	-	630.00	630.00
Mo.	250.00	-	750.00	187.00	-	-	-	1,187.00
N. Dak.	-	-	-	40,000.00	-	-	-	40,000.00
Wis.	-	-	1,600.00	-	-	-	-	1,600.00
Subtotals	250.00	-	\$ 3,250.00	\$85,187.00	-	-	\$ 630.00	\$ 89,317.00

CONTRIBUTED SERVICES**

Iowa	\$ 200.00	\$ 100.00	\$ 300.00	\$ 20,000.00	-	-	-	\$20,600.00
Kans.	200.00	600.00	600.00	-	-	-	-	1,400.00
Minn.	13,000.00	15,000.00	2,450.00	-	-	1,100.00	425.00	31,975.00
Mo.	-	500.00	-	-	-	-	-	500.00
Nebr.	200.00	1,200.00	700.00	-	-	-	-	2,100.00
N. Dak.	15,000.00	7,500.00	4,500.00	-	-	500.00	-	27,500.00
S. Dak.	2,000.00	2,500.00	1,500.00	-	-	500.00	-	6,500.00
Wis.	500.00	1,200.00	-	1,000.00	-	200.00	-	2,900.00
Subtotals	\$31,100.00	\$28,600.00	\$10,050.00	\$21,000.00	-	\$2,300.00	\$ 425.00	\$ 93,475.00
GRAND TOTALS	\$36,350.00	\$36,200.00	\$74,300.00	\$108,187.00	-	\$2,300.00	\$3,055.00	\$260,392.00

*Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

**Limited to services incidental to other activities for which only an estimated value is available.

Corrected

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

SOUTHERN REGION

ANNUAL PROGRAM REPORT

GRASSHOPPER

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Regulatory, Control, Research, and Extension Agencies of
the Affected States

DEC 6 1957
Gulfport, Mississippi

C. C. Fancher
Regional Supervisor

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I. INTRODUCTORY

A. Statement of Problem

In the Southern Region, past records indicate that grasshoppers become of economic importance most frequently in parts of north-west Texas and western Oklahoma. Under prolonged periods of drought, the infestations extend throughout these states and into parts of Arkansas. For short and infrequent periods, limited crop damage has been reported in local areas of Alabama, Florida, Georgia, and Mississippi.

During the period 1953-1956, farmers, under voluntary control programs, protected the following total acres of cropland in the states of Arkansas, Oklahoma, and Texas. Estimated "savings" and "losses" are also given.

<u>State</u>	<u>Acres Protected</u>	<u>Dollar Loss</u>	<u>Dollar Savings from Control</u>
Arkansas	203,000	\$ 124,000	\$ 1,052,750
Oklahoma	2,403,836	5,577,500	3,949,275
Texas	2,989,150	16,331,050	17,208,520

For the same 4-year period, under cooperatively conducted range-land Rancher-State-Federal programs, the following acreage was treated. The total cost of this cooperative work is likewise given.

<u>State</u>	<u>Acres Treated</u>	<u>Total Cost</u>
Arkansas	-	\$ -
Oklahoma	370,784	132,444
Texas	866,396	447,149

B. Program Justification Statement

State and federal cooperatively conducted surveys in Arkansas, Oklahoma, and Texas during the late summer and fall of 1956 indicated the biological problem in 1957 to be as follows:

<u>State</u>	<u>Infested Acreage</u>		
	<u>Rangeland</u>	<u>Cropland</u>	<u>Total</u>
Arkansas	230,000	65,000	315,000
Oklahoma	1,120,000	2,800,000	3,920,000
Texas	4,800,000	4,500,000	9,300,000
Totals	6,150,000	7,385,000	13,535,000

The Southern Regional office, on March 15, 1957, advised the Agricultural Research Service, Plant Pest Control Division, Washington, D. C., that the probable acreage that might qualify under cooperative control action before July 1, 1957, would not exceed the following:

<u>State</u>	<u>Infested Acreage</u>		
	<u>Rangeland</u>	<u>Cropland</u>	<u>Total</u>
Arkansas	20,000	--	20,000
Oklahoma	350,000	--	350,000
Texas	480,000	--	480,000
Totals	850,000		850,000

C. Program Objective

The overall objective of grasshopper control work is to keep these pests from damaging cultivated and native crops. In the rangeland areas, control is accomplished under what is known as Rancher-State-Federal cooperative rangeland programs. A single undertaking usually involves several thousand acres of infested land. Grasshoppers in crop areas are handled on an individual farm or community basis. This latter type of control is paid fully by the farmer or farmers concerned. Division and State personnel provide the farmers with survey data and technical control information. The insecticides and application techniques now available provide practical and economical control.

D. Changes from Work Plan

The moisture and cold temperature received in the grasshopper infested areas of the three states under discussion during the late winter of 1956 and early spring of 1957 succeeded in breaking the drought, destroyed some grasshopper eggs, caused nymphal mortality in varying degrees, and permitted excellent grass, forage, and crop growth throughout the area. As a result of these climatic factors, farmers found it unnecessary to perform grasshopper control work for the protection of cultivated crops.

Rancher interest in the infested rangeland areas decreased to such an extent that organized cooperative rangeland control undertakings were restricted to one program in parts of Dallam and Hartley Counties, Texas. The acres treated under this cooperative plan totaled 48,918, at a cost of \$21,540, or an average of 44¢ per acre. Of this amount, the non-federal cooperators paid \$14,360, and the Plant Pest Control Division \$7,180.

E. Status of Infestation

Based upon incomplete data now available, it is unlikely that grasshopper control on an individual or cooperative basis will be necessary throughout this 3-state area during the remainder

of the present control season. The Outlook Map that will be prepared by the Plant Pest Control Division will portray the 1958 potential grasshopper picture for the United States.

II. PROGRAM HISTORICAL INFORMATION

Congress first recognized the grasshopper problem in 1877, when it established the U. S. Entomological Commission and authorized it to investigate the possibility of alleviating the grasshopper menace in the West. However, the first organized Federal-State cooperative control work was not undertaken until 1934. Damaging infestations occur most frequently in the arid or semiarid states of the West. In the Southern Region, the problem is confined principally to the states of Arkansas, Oklahoma, and Texas. In Arkansas, the infestations are usually local in nature. For the past several years, damage to cultivated crops has been kept low through the timely application of State and Federal recommended control measures by farmers on an individual or community basis. State and Division officials provide survey and technical information to farmers, agricultural organizations, and other interested groups. In areas where grasshoppers require control on low-value rangeland, cooperative Rancher-State-Federal control programs are developed, and the results of these programs have been most gratifying. The total per-acre cost during this fiscal year ranged from a low of 44¢ to a high of 55¢.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

In areas where surveys showed that damaging infestations of grasshoppers were liable to develop, Federal, State, and Extension Service personnel cooperated by advising farmers, ranchers, and others in the affected areas. In rangeland areas, preliminary meetings were called at which rancher committees were formed and estimates were made of probable range acreage to be treated. Division and State personnel supervised the application of insecticide and checked mortality of grasshopper populations. Grasshopper infestations in cropland are usually confined to field margins, fence rows, roadsides, and fallowed areas which do not lend themselves to cooperative effort. Under these conditions, appropriate control action is the individual responsibility of the farmers concerned, and the full cost of this work is paid by them. State and Federal officials, however, provide survey information and technical control assistance. Regional supervision and assistance are provided as necessary.

The following recommendations are made for the coming year:

- (1) The Regional map portraying the grasshopper infestations throughout the United States for the coming year (1958 season) should be completed and released to the general public as soon after the surveys are completed as is practicable. If possible, the maps should be available for

distribution before the end of the 1957 calendar year.

- (2) The grasshopper picture for the 1958 season, biologically interpreted in terms of acres by Regions, should be made available to the Plant Pest Control Division, Agricultural Research Service, Washington, D. C., as soon after the surveys are completed as is practicable.
- (3) Following completion of farmer meetings which are held during the winter months, the Washington office should be advised as to the probable acreage that will economically qualify for control during the coming season. This, of course, would be based entirely upon rancher interest.
- (4) Actual justification statements, the basis on which contingency funds are requested, should not be submitted to Washington until after nymphal surveys are completed and control areas are definitely determined.

B. Technical Assistance

The type of assistance obtained from research workers, as applied to grasshopper control, is contained in PA-149, Revised 1953, and entitled "Grasshopper Control"; and also in Farmers Bulletin No. 2064, entitled "Grasshoppers - A New Look at an Ancient Enemy." This information is clear-cut and adequate for our needs in the control of grasshoppers, both in cropland and under rangeland conditions.

Program personnel provided technical assistance to farmers in the crop areas with regard to infestations, recommended insecticides, dosage, and timing of applications. They also made available survey information relative to infestations in rangeland, which is the basis for the development of Rancher-State-Federal control work.

C. Survey

The objective of grasshopper surveys is twofold. First, as a basis for control action, existing infestations are located and delimited and the density or severity determined; and second, after the planned control has been accomplished, a survey is made to evaluate and determine the effectiveness of the work.

The presence or absence of grasshoppers is determined by surveys conducted annually by Division and State personnel. The first of these, the adult survey, takes place in the summer or early fall after the grasshoppers have reached maturity and have more or less congregated for egg laying. Later in the fall or early winter after the grasshoppers have died, an egg survey is conducted which gives an indication as to the grasshopper populations that may be expected the following year throughout the infested areas. Nymphal surveys are made in the spring, as the grasshoppers hatch. The information obtained from this latter survey actually determines the presence of young grasshoppers and is the basis on which control action is predicated.

During the current fiscal year, grasshopper surveys were made on either a county or district basis throughout Oklahoma and Texas.

D. Eradication or Control

Control effort on an individual or cooperative basis was recommended whenever grasshoppers were present in sufficient numbers to threaten native or cultivated crops. Grasshopper control should be considered a regular farming or ranching practice. Grasshopper build-up, in either cropland or rangeland, would be impossible if ranchers and farmers on an individual basis would apply appropriate control measures whenever and wherever the hoppers appear in threatening numbers. If and when grasshopper infestations on low-value rangeland extend beyond the individual rancher's ability to handle successfully, cooperatively conducted control programs are developed jointly by the interested ranchers, state agencies, and the Federal Government. Two-thirds of the cost of these programs is furnished usually by non-federal cooperators, and one-third by the Federal Government. Where crop infestations are concerned, State and Federal assistance is limited to survey information and technical control advice.

The insecticide used by cooperatively conducted rangeland control programs in the states of Oklahoma and Texas was aldrin at the rate of 2 ounces of actual aldrin per acre. The rate of application was 1 gallon of solution per acre. Each gallon of solution consisted of diesel oil and 2 ounces of aldrin. This formulation was very effective when properly applied. In controlling grasshoppers in crop areas, farmers use the insecticides recommended in PA-149, Revised 1953, entitled "Grasshopper Control."

The amount of grasshopper control performed by farmers in the crop areas of Oklahoma and Texas during this same period is not known. Incomplete reports, however, indicate that only minimum work on a local basis was accomplished. This is readily understood when it is remembered that most of the crops attacked by grasshoppers were mature or had been harvested at the beginning of this fiscal year, and the crops grown so far this season are lush and abundant due to the presence of adequate moisture.

E. Regulatory

All grasshopper control work, whether on rangeland or in crop areas, was performed on a voluntary basis.

F. Methods Improvement

For the past several years, the Plant Pest Control Division personnel and State cooperators have cooperated very closely with government and industry research in improving grasshopper control techniques. The principal aims have been to find and use the most effective insecticides, apply these in the most effective manner, and keep the cost low. The cost of the cooperative control work just concluded in Dallam and Hartley Counties, Texas, was 44¢ per acre. The finished aldrin-oil solution was delivered at points of use in tanks for 26¢ per gallon. Application by aircraft was 16¢ per acre. Survey and supervision accounted for the remaining 2¢ of this overall cost.

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

VOLUNTARY AND COOPERATIVELY FINANCED GRASSHOPPER CONTROL PROGRAM

ESTIMATES OF ACRES PROTECTED, LOSS IN DOLLARS, AND SAVINGS IN DOLLARS

FISCAL YEAR 1957

State	Voluntary Control			Cooperatively Financed Control		
	Protected (Acres)	Loss Caused (Dollars)	Savings From Control (Dollars)	Protected (Acres)	Loss Caused (Dollars)	Savings From Control (Dollars)
Oklahoma	108,639	750,000	251,700	98,368	708,750	31,050
Texas		Information not available				
Totals	108,639	750,000	251,700	98,368	708,750	31,050

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COOPERATIVE RANGE GRASSHOPPER CONTROL OPERATIONS

ACREAGES SPRAYED AND COSTS

FISCAL YEAR 1957

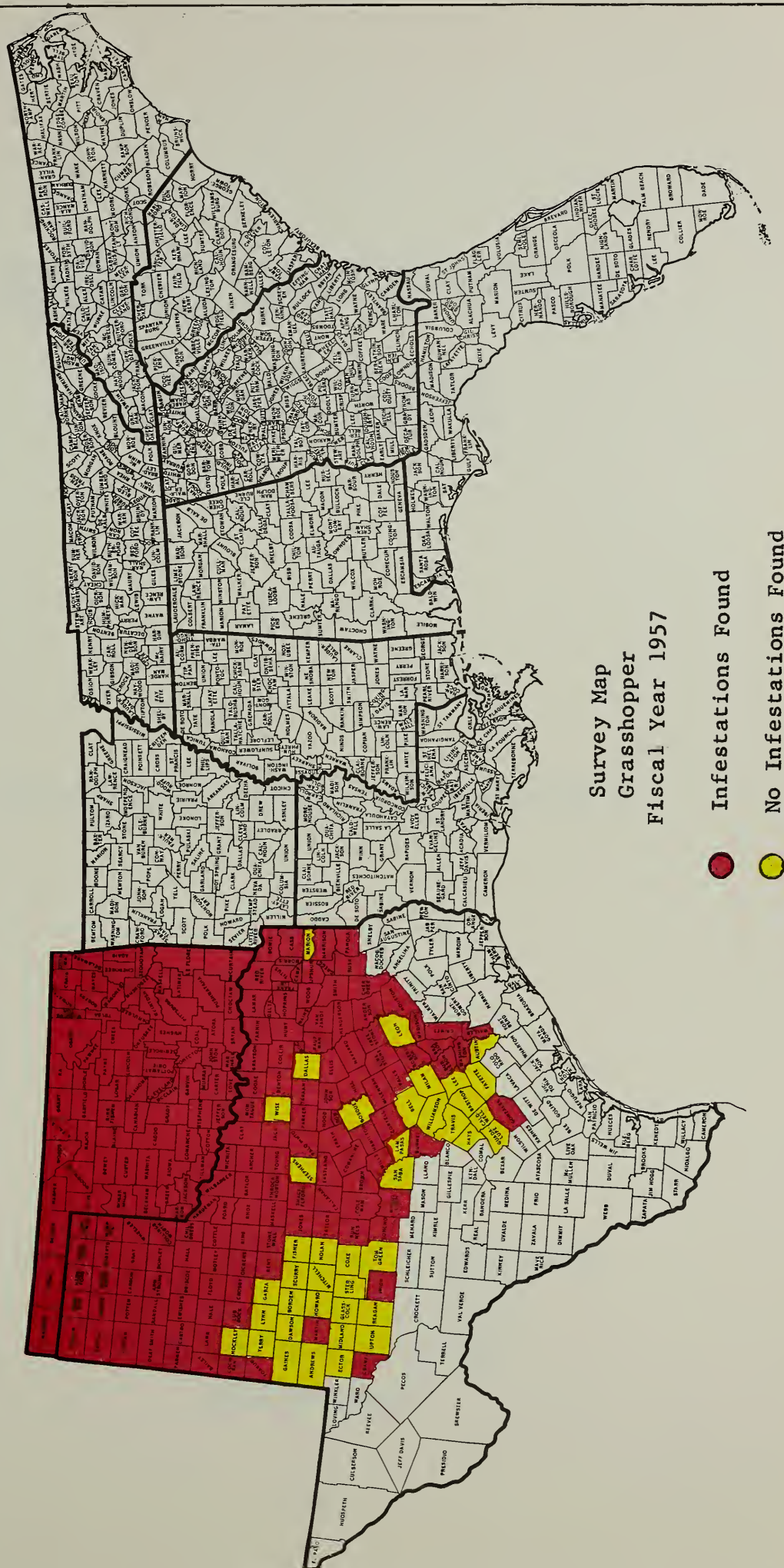
State and County	Period of Control Operations	Acreage Sprayed		Total Acres Treated	Costs			Total Cost	Average Cost Per Acre
		Contract Aircraft	Ground Equipment		States, Counties, & Landowners	Other Co-operating Fed. Agcs.	Plant Pest Control Division		
Oklahoma	6/30-7/11/56	98,638	--	98,638	32,970.80	--	16,485.40	49,456.20	0.50
Texas		98,638	--	98,638	32,970.80	--	16,485.40	49,456.20	
Totals									
Texas	7/16-26/56	70,176	--	70,176	17,826.44	--	18,542.71	36,369.15	0.52
Dallam	7/6-28/56	141,534	--	141,534	48,631.01	--	24,315.51	72,946.52	0.52
Hartley	6/30-7/6/56	35,410	--	35,410	12,879.75	--	6,439.72	19,319.47	0.55
Oldham									
Dallam- Hartley- 1/	6/26-7/9/57	48,819	--	48,819	14,360.02	--	7,180.00	21,540.02	0.44
Totals		295,939	--	295,939	93,697.22	--	56,477.94	150,175.16	
GRAND TOTALS		394,577	--	394,577	126,668.02	--	72,963.34	199,631.36	

1/Actual spray work accomplished before June 30, 1957.

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SOUTHERN REGION PLANT PEST CONTROL DIVISION





GRASSHOPPER CONTROL

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PROGRAM ANNUAL REPORT

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**UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION**



* _____ *

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION

ANNUAL PROGRAM REPORT

GRASSHOPPER CONTROL

July 1, 1956 - June 30, 1957

Cooperating Agencies:

State Departments of
Agriculture, Counties, Local Agencies, Private
Individuals and Other Federal Agencies
of the Eleven Western States

October 30, 1957
Oakland, California

Jim R. Dutton
Regional Supervisor

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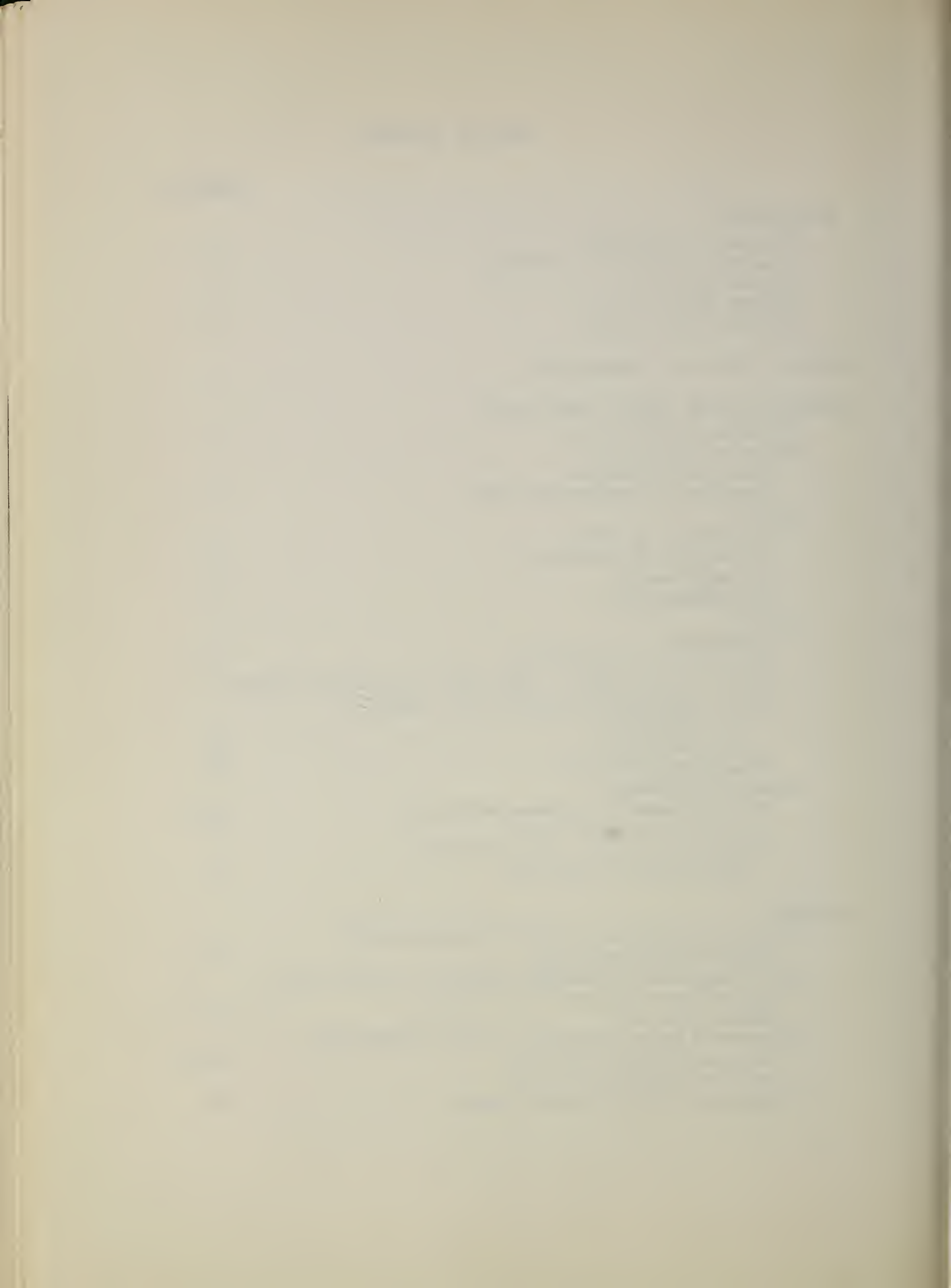


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INTRODUCTORY

Statement of Problem

Grasshoppers are generally considered to be among the most destructive native insects attacking food, forage, and fibre crops in the continental United States. Unless controlled, they are capable of inflicting complete destruction to those crops and each year are a recurrent threat to agriculture in all of the states of the Western Region. During the 1956 growing season the States of California, Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming estimated their crop losses caused by grasshoppers at \$9,823,000, and the Bozeman laboratory of the Division of Cereal and Forage Insect Investigations has estimated that the average annual loss to crops and range forage combined, in the seventeen states west of the Mississippi River, is close to 90 million dollars. Throughout the first part of this fiscal year widespread drouth conditions in the southeastern and east central portions of the Region added impetus to the problem.

Annual variations in location and degree of infestation occur, but fundamentally our problems remain quite constant from year to year. In midsummer of 1956 grasshoppers on rangeland threatened some 7,300,000 acres and in the spring of 1957 some 12,100,000 acres in the eleven states of the Region. In addition, these pests were a threat in many cultivated areas. Control became an emergency matter requiring the all-out efforts of all coöperators to abate damage.

Program Justification Statement

Infestations occurred on valuable rangelands, which in many cases were adjacent to croplands. Grasshopper populations were of sufficient density to cause severe competition between grasshoppers and livestock and wildlife. Cooperative control work was necessary to protect infested range, prevent spread of grasshoppers to additional range and cropland, minimize the threat of livestock dislocation, and to avoid serious erosion consequences.

Program Objective

Long-range objectives are to familiarize landowners, agricultural groups, and State, County, and Federal officials with the recurring nature of the problem, facilitating timely community action culminating in the control of infestations of these pests before they build up to outbreak proportions. The protection thus afforded endures in most cases for several years and is

insurance against soil erosion and the associated factors that affect or disrupt production of food, fibre, and forage crops. The immediate objective is to hold current season crop and range losses to a minimum and prevent the displacement of livestock.

Changes From Work Plan

Work plans for FY 1957 for rangeland grasshopper control work were based on biological need in areas where state and rancher cooperation were likely to be forthcoming. Later developments, such as devastating winter storms, drouth conditions, failure of some infestations to develop, natural mortality, excessive forage, and lack of interest on the part of ranchers, were contributing factors toward reductions in acreages and, in some cases, even complete elimination of areas contemplated for control. These reductions totaled 1,868,000 acres consisting of 331,000 acres in California, 430,000 acres in Colorado, 228,000 acres in New Mexico, 300,000 acres in Oregon, 21,190 acres in Utah, and 558,000 acres in Wyoming. On the other hand, increased interest on the part of ranchers in Montana brought on a 438,816-acre expansion in that State's contemplated program.

Status of Infestation

Accomplishments and Work Remaining To Be Done

In July and August of FY 1957 (calendar year 1956), 578,090 acres were treated in the States of Arizona, California, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming. During May and June 1957, 1,301,588 acres of cooperative rangeland spray work were done in seven states as follows: Montana, 518,816; California, 164,143; Nevada, 8,240; New Mexico, 121,614; Colorado, 5,097; Utah, 40,780; Wyoming, 442,898.

These accomplishments, coupled with the areas which dropped out of the program as stated in the paragraph under "Changes From Work Plan," left a total of 434,700 acres to be treated in July and August of FY 1958 as follows: Arizona, 100,000; California, 3,500; Colorado, 13,000; Idaho, 106,000; Montana, 150,200; Nevada, 12,000; Utah, 50,000.

Total area treated during FY 1957 on cooperative rangeland work was 1,879,675 acres.

PROGRAM HISTORICAL INFORMATION

Active federal participation in grasshopper control, involving direct expenditure of federal money, was started in 1934. Poison bait was the most commonly recommended method of control for more than half a century. Insecticidal material used in baits involved some form of arsenical up until 1943, sodium fluosilicate from 1943 through 1948, and chlorinated hydrocarbons, such as chlordane and toxaphene, during 1949 and 1950. Aerial application of these baits in dry form was utilized on a large scale on cooperative rangeland programs in 1949 and 1950. In 1951 these aerial programs changed from baits to sprays, using aldrin as an insecticide. Active federal participation in cropland control ceased with the beginning of large scale cooperative rangeland work in 1949. Financing for these programs on private and state land is furnished two-thirds by states, counties and landowners, and the final one-third by the Plant Pest Control Division. Responsibility for public domain is borne primarily by the federal government.

PROGRAM ACTIVITY DURING FISCAL YEAR

Planning and Direction

The reorganization of the Division has placed prime responsibility for planning and direction on Area Supervisors who develop, to fit their states and districts, the broad policy originating at the Regional level. Actual planning and direction are jointly shared between our supervisors and their counterparts within the states. Work plans are developed out of needs apparent from fall surveys, but are subject to change as infestations develop or fail to develop in spring and summer.

Technical Assistance

Received By Program

Division supervisors consult with technical people within their respective states concerning materials and methods enabling them to make recommendations conforming as closely as possible to those of each state. The Cereal and Forage Insect Investigations, Entomology Research Division, Agricultural Research Service Laboratory at Bozeman, Montana, works closely with us in control operations. They were especially helpful in working out the problems that

arose in connection with the attempts that were made to utilize the chemical heptachlor, as an alternate insecticide to aldrin for rangeland control work.

Rendered by Program Personnel

Technical assistance is the only type of aid offered to farmers on cropland grasshopper problems by the Division. Such technical assistance is likewise made available on rangeland grasshopper problems, even where actual cooperative control programs do not materialize. The adult, egg, and nymphal surveys conducted, tabulated, and mapped by the Division in conjunction with its cooperators are good examples of one type of technical assistance offered by the program.

Survey

Objectives and Uses

Control work conducted to suppress infestations of grasshoppers is based upon information derived from the three surveys conducted by Division personnel and their cooperators. Adult surveys made in late summer to determine where, how many, and what species exist, augmented, where necessary, by egg surveys later in the fall, are tabulated, mapped, and used as a means of determining infestation potential for consideration for the following field season. Pre-control nymphal surveys are made in the spring, after egg hatch, to ascertain degree of infestation. Recommendations to cooperators and plans for cooperative control programs are based on a combination of these three surveys.

Procedures or Techniques

Rating tables were revised this fiscal year as follows: The old rating table was used on cropland, but a new table requiring lower counts to give the same rating was used on rangeland. Data from both types of stops were combined on one survey map. The decision has since been made to return to the old system on future surveys, using a single revised rating table, because the current map resulted in an erroneous picture in areas where mixed cropland and rangeland infestations occurred. The same survey procedures and techniques were employed that have been used for a number of years.

Accomplishments

Nymphal surveys are conducted in the spring, in both rangeland and cropland areas presumed economically infested as indicated by fall surveys, to form a basis for cooperative rangeland programs and technical assistance to farmers.

Egg surveys are conducted, at the election of Area Supervisors, in late fall to verify adult surveys and suspected late flights.

The strongest emphasis is placed on the adult survey because this survey gives a clearer and more detailed picture than is possible to attain at any other time during the grasshopper's life cycle. It is made at peak populations, and reveals the maximum potential that could occur, the species involved, and includes information on damage to the habitat. The following table entitled "1956 Adult Grasshopper Survey" and map entitled "Grasshopper Outlook - 1957, Based on 1956 Surveys" are a record of survey work performed and data obtained.

Recommendations

The recommendation has been approved to return to the use of a single, revised rating table for adult survey. This rating table will be a compromise between the old single table and the one used for rangeland in the 1956 survey.

Control

Objective

The objective of control is to reduce populations of the insect on the area treated to the extent that crop or range losses will be substantially lowered, and that the threat of further build-up of that particular infestation will be eliminated.

Procedures or Techniques

Cooperative rangeland treatment is accomplished by contracted aircraft applying at the rate of one gallon per acre, an insecticide-oil solution containing either two ounces of aldrin or three ounces of heptachlor per gallon of fuel oil as a spray. Voluntary control work, financed strictly by landowners, is accomplished most generally with sprays

UNITED STATES DEPARTMENT OF AGRICULTURE

Agricultural Research Service

Plant Pest Control Division

WORK REPORT

1956 ADULT GRASSHOPPER SURVEY

GRASSHOPPER CONTROL

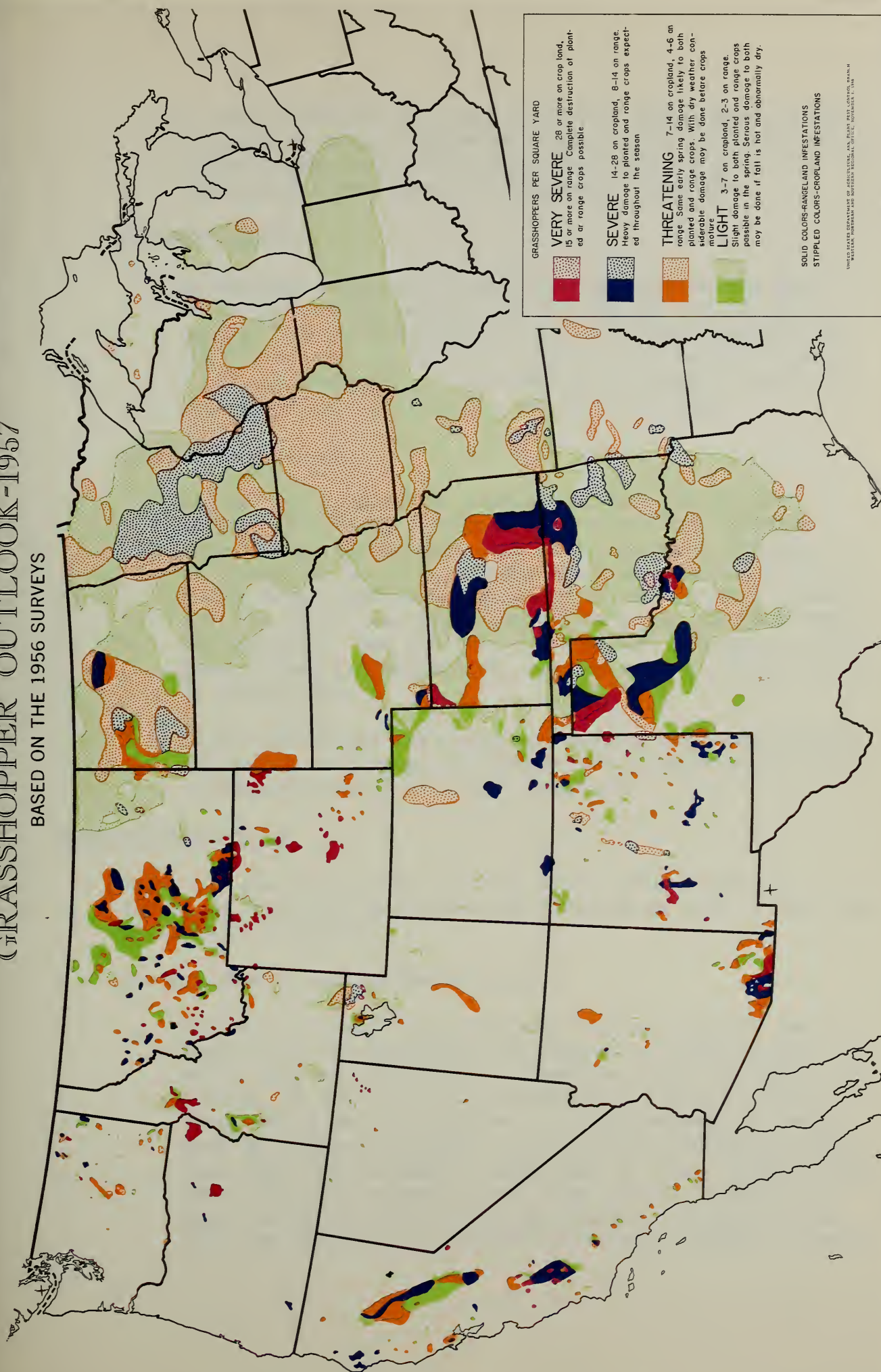
Region Western

State	No. of Counties Surveyed	Total No. of Stops	Miles Traveled on Survey	No. of Men		Man. Days		Time Period	
				PPCD	State & Co.	PPCD	State & Co.	Start	Stop
Arizona	13	337	10,519	6	1	43	0.5	6/26/56	9/28/56
California	39	355	*	2	15	*	*	4/25/56	9/14/56
Colorado	42	316	8,927	5	1	52	3	7/21/56	8/27/56
Idaho	43	420	*	8	1	*	*	7/23/56	8/31/56
Montana	53	703	*	6	0	*	0	7/24/56	9/9/56
Nevada	11	98	*	2	1	*	*	7/6/56	9/17/56
New Mexico	31	312	*	8	0	91	0	7/26/56	9/6/56
Oregon	15	74	6,260	3	0	31.8	0	7/23/56	8/8/56
Utah	29	212	7,082	3	0	*	0	8/7/56	8/17/56
Washington	21	106	3,976	2	0	19	0	7/30/56	8/23/56
Wyoming	23	223	10,334	7	0	46.25	0	8/13/56	8/23/56
Total	320	3156	*47,098	52	19	*283.05	*3.5	4/25/56	9/28/56

* Data Incomplete

GRASSHOPPER OUTLOOK-1957

BASED ON THE 1956 SURVEYS



or dusts, applied by either custom or individually-owned aircraft or ground equipment, using aldrin, dieldrin, heptachlor, toxaphene, or chlordane. Chlorinated hydrocarbon insecticides continue to be extremely effective.

Accomplishments

Cooperative rangeland control accomplishments are depicted in table form, and also on the control map, in this report. The determination of actual accomplishments for the fiscal year in both the table and the map was based on fiscal year funds. Only that work financed from fiscal year 1957 funds is shown in the table and map.

Changes Recommended

The greatest individual weakness of this program is our lack of sufficiently trained supervisory and technical help. It is recommended that each supervisor continue to attempt to procure the best possible seasonal help of the type most apt to be available to us in future seasons, and that these seasonal employees be given the best training possible. The addition of permanent personnel to any great extent is impractical, because of the seasonal nature of the program.

It is recommended that Area Supervisors urge their state and county cooperators to assume more responsibility for organizing control areas for treatment.

Methods Improvement

It is our aim to put into wide field use cheaper and less dangerous insecticides approved by research, as well as improved application equipment.

Accomplishments and Recommendations

During the fiscal year 1957 the Division acquired and put into use in the rangeland GHC program a limited number of mobile and portable radios. These were used in ground-to-ground, and ground-to-air (observation plane) communication, and showed great promise as an improvement in our control of contract aircraft. It is our recommendation that much wider use be made of this type of communication equipment. We also recommend that every effort be made to induce the agricultural aviation industry to procure from FCC, for their use, an assigned frequency within the reach

of the radios commonly found in most aircraft. The air-to-air communication that this would make possible, coupled with our mobile and portable radios, would give us indirect, but immediate, contact with spray planes, and even further improve our control of application. The mobile and portable radios have also greatly facilitated our efforts in "kill-checking" and nymphal surveying, and further thought on and development of this use of the radios should even further improve this phase of our work.

The use of heptachlor at the rate of 2-oz. per acre, as recommended by our research group as an alternate insecticide to aldrin, was tried on one large-scale control area this year. Kills were very poor and, as a result, field supervisors considered the 2-oz. per acre of heptachlor to be a marginal dosage. Consequently, subsequent 1958 field season bid invitations requested heptachlor at the rate of 3-oz. per gallon instead of two.

Our field supervisors are being requested to bring sensitized plates into more widespread use as a means of checking coverage of insecticide.

There is an extreme need for greater assurance that our contractors meet bid specifications on formulated insecticide. We feel that this will require a government representative at all mixing points. This representative could obtain assurance of acceptable material either by constant observance of formulation from a known technical material or a concentrate on through the preparation of the field solution, or by actual chemical analysis of the field solution as it leaves the mixing station for point of use. The latter could involve costly and undesirable time delays. It is recommended that if samples of field solutions be taken for analysis, an improvement be made in the present system of taking samples. The Bacon Bomb Sampler shows some promise and may prove a means of obtaining more representative samples. It is recommended that a definite decision be made before the next field season on a means of assuring compliance of insecticide specifications, and that the system decided upon be used on all contracts. The prospectus would be altered to fit the plan decided upon.

Better maps for field use are needed to more accurately pinpoint control areas for spray pilots. It is recommended that all supervisors try to utilize topographical maps made by the Geographical Survey in conjunction with section maps normally used in our work.

The GHC bid invitations should require that not only the insecticide contractor be required to meet gpm plane loading requirements throughout his equipment, but that the airplane contractor furnish loading hoses and nozzles capable of carrying these minimum requirements.

It is suggested that there may be justification for further investigation on particle size in plane application. This suggestion stems from a field observation of an example of outstanding results from a plane emitting material of a fog-like nature.

Crop and Rangeland Losses

Grasshoppers annually cause crop and range grass losses in all states of the Western Region. We do not have complete reports from all states. Since losses must be estimated for an entire growing season, a fiscal year report is not available, and it was found necessary to include in this report data extracted from the loss table out of the 1956 Grasshopper Program Annual Report. This table includes losses from both grasshoppers and Mormon crickets.

Cooperation, Funds, and Associated Activities and Services

These categories of this report are fully covered in the attached tables, each of which is self-explanatory.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

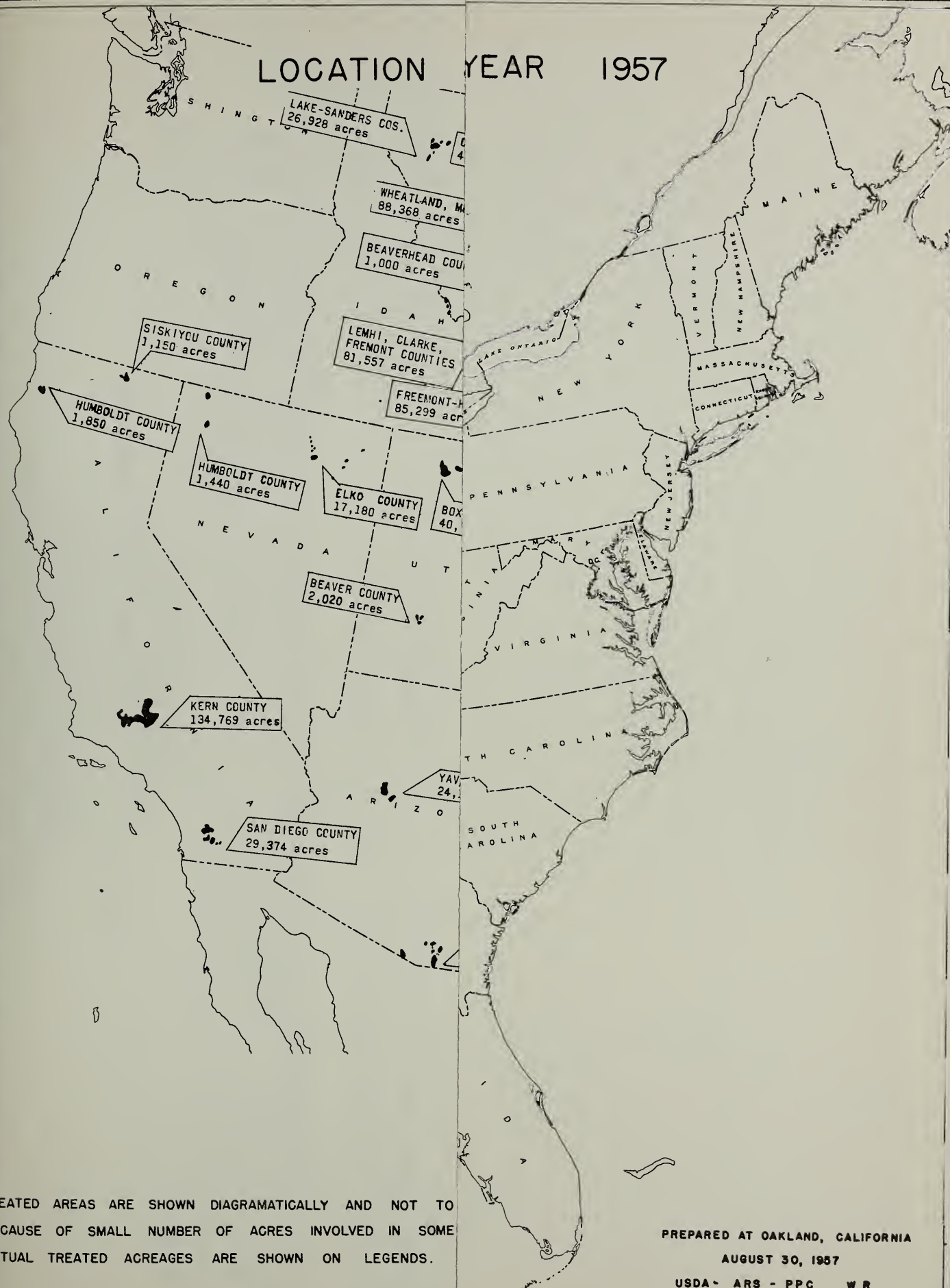
COOPERATIVE RANGELAND CONTROL ACCOMPLISHMENTS
DURING FISCAL YEAR 1957

Region Western

GRASSHOPPER CONTROL

State	Private and State Lands (Acres)	Federal Lands (Acres)	Total Acreage
Arizona	85,821	28,968	114,789
California	164,143	3,000	167,143
Colorado	4,097	1,000	5,097
Idaho	20,516	61,041	81,557
Montana	182,596	365,265	547,861
Nevada	12,720	5,900	18,620
New Mexico	424,853	12,077	436,930
Oregon	0	0	0
Utah	40,780	2,020	42,800
Washington	0	0	0
Wyoming	376,040	88,838	464,878
Totals	1,311,566	568,109	1,879,675

LOCATION YEAR 1957



TREATED AREAS ARE SHOWN DIAGRAMATICALLY AND NOT TO BECAUSE OF SMALL NUMBER OF ACRES INVOLVED IN SOME ACTUAL TREATED ACREAGES ARE SHOWN ON LEGENDS.

TOTAL ACRES TREATED - 1,879,675

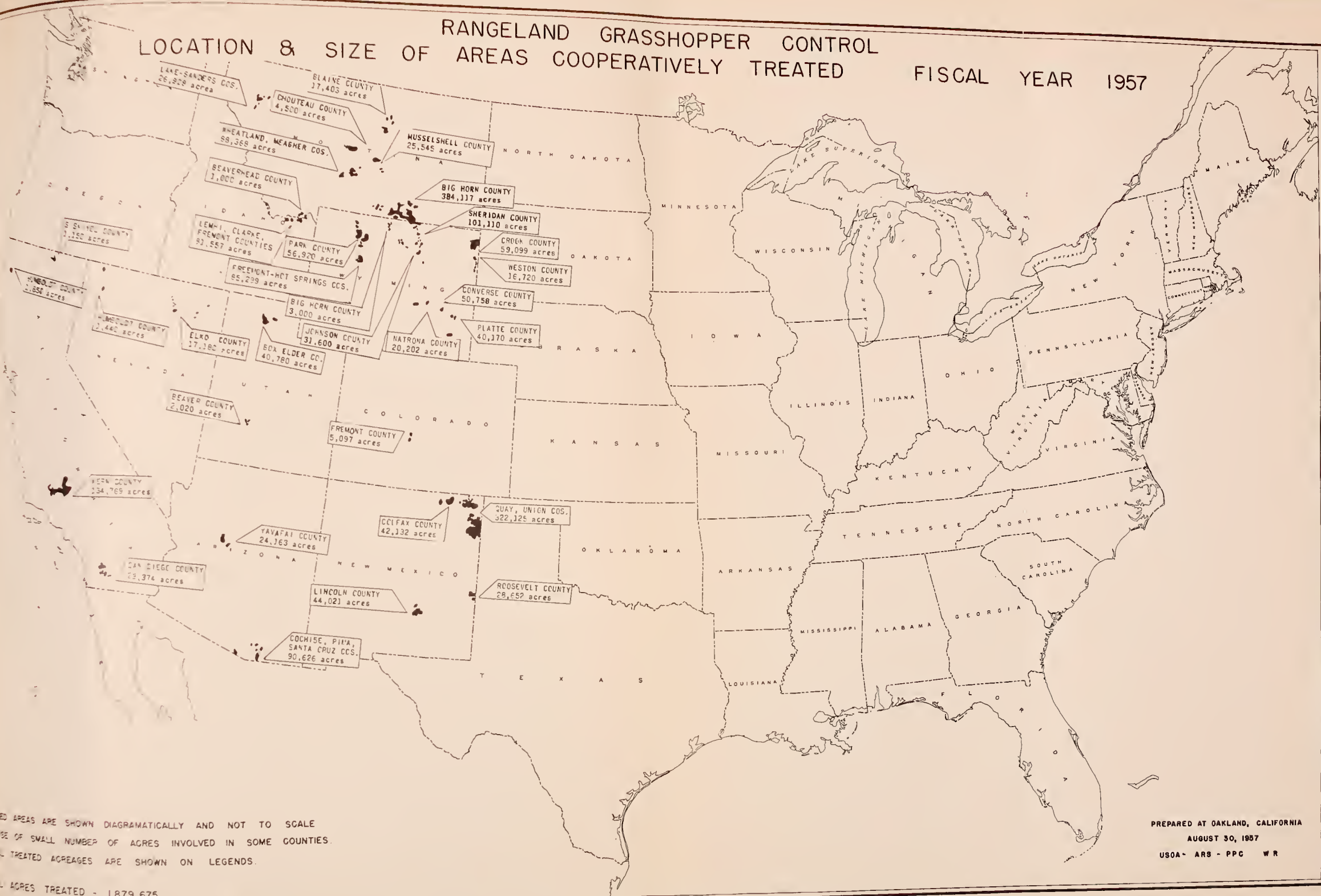
PREPARED AT OAKLAND, CALIFORNIA

AUGUST 30, 1957

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RANGELAND GRASSHOPPER CONTROL LOCATION & SIZE OF AREAS COOPERATIVELY TREATED

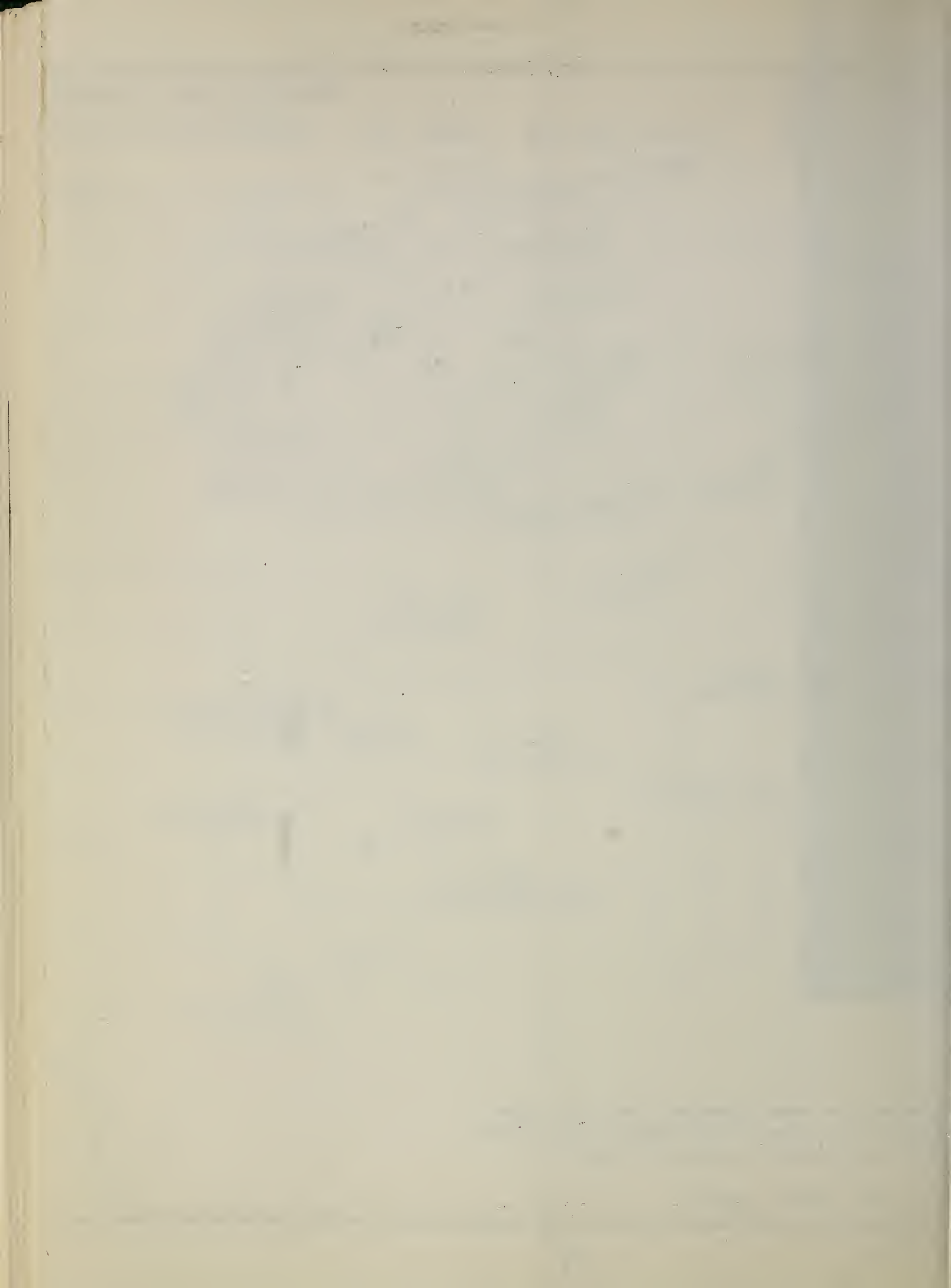
FISCAL YEAR 1957



TREATED AREAS ARE SHOWN DIAGRAMMATICALLY AND NOT TO SCALE
BECAUSE OF SMALL NUMBER OF ACRES INVOLVED IN SOME COUNTIES.
ACTUAL TREATED ACREAGES ARE SHOWN ON LEGENDS.

TOTAL ACRES TREATED - 1,879,675

PREPARED AT OAKLAND, CALIFORNIA
AUGUST 30, 1957
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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

COOPERATIVE RANGE GRASSHOPPER CONTROL OPERATIONS
ACREAGES SPRAYED AND COSTS
GRASSHOPPER CONTROL

Region Western

Fiscal Year 1957

State and Location	Period of Control Operations	Acreage Sprayed		Total Acres Treated	C o s t s			Total Cost	Average Cost Per Acre
		Contract Aircraft	Ground Equipment		States, Counties, & Landowners	Other Co-operating Fed. Agcys.	Plant Pest Control Division		
Arizona									
Prescott Area (Yavapai Co.)	9/11-9/14, 56	24,163	---	24,163	\$8,315.17	---	\$4,157.49	\$12,472.66	\$0.5162
Nogales Area (Cochise, Pima & Santa Cruz Counties)	9/7-9/18, 56	90,626	---	90,626	27,283.20	---	21,426.46	48,709.66	0.5375
Total		114,789	---	114,789	\$35,598.37	---	\$25,583.95	\$61,182.32	\$0.5329
California									
Tulelake Area	7/17, 56	---	1,150	1,150	---	\$233.00	\$ 902.31	\$ 1,135.31	\$0.9872
Bear River Area (Humboldt Co.)	7/1-7/14, 56	---	1,850	1,850	1,230.21	---	80.52	1,310.73	0.7085
Wheeler Ridge (Kern Co.)	5/4-5/28, 57	132,383	---	132,383	36,399.78	---	58,731.13	95,130.91	0.7186
Wheeler Ridge Plots (Kern Co.)	6/20-6/23, 57	2,385	---	2,385	---	---	2,343.17	2,343.17	0.9824
Warner Hot Springs-Santa Ysabel (San Diego Co.)	5/22-6/12, 57	19,612	9,762	29,374	12,490.30	---	6,245.15	18,735.45	0.6412
Total		154,380	12,762	167,142	\$50,120.29	\$233.00	\$68,302.28	\$118,655.57	\$0.7055

(Continued)

COOPERATIVE RANGE GRASSHOPPER CONTROL OPERATIONS--ACREAGES SPRAYED AND COSTS (Continued)

Region WesternFiscal Year 1957

State and Location	Period of Control Operations	Acreage Sprayed		Total Acres Treated	C O S T S				Total Cost	Average Cost per Acre
		Contract Aircraft	Ground Equipment		States, Counties, & Landowners	Other Co-operating Fed. Agcys.	Plant Pest Control Division			
Colorado										
Fremont Co.	6/28-7/6,57	5,097	--	5,097	\$2,458.20	--	\$2,129.10	\$4,587.30	\$ 0.9000	
Total		5,097	--	5,097	\$2,458.20	--	\$2,129.10	\$4,587.30	0.9000	
Idaho										
Lemhi, Clark, & Fremont Cos.	6/26-8/3,56	81,557	--	81,557	10,275.00	--	45,832.14	56,107.14	0.6900	
Total		81,557	--	81,557	\$10,275.00	--	\$45,832.14	\$56,107.14	\$ 0.6879	
Montana										
Lewis & Clarke Nat'l. Forest (Musselshell Co.)	7/3-7/13,56	25,545	--	25,545	--	--	15,404.26	15,404.26	\$ 0.6030	
Red Rock Lake Refuge (Beaverhead Co.)	6/27-7/6,56	--	1,000	1,000	--	\$153.00	458.39	611.39	0.6100	
Ft. Belknap Ind. Res. (Blaine Co.)	7/31-8/12,56	--	2,500	2,500	--	125.00	949.78	1,074.78	0.4300	
Wheatland-Meagher Co.	6/20-7/6,57	88,368	--	88,368	27,506.66	--	16,673.52	44,180.18	0.5000	
Ft. Belknap Ind. Res. (Blaine Co.)	6/29-7/4,57	14,903	--	14,903	1,600.00	--	7,664.33	9,264.33	0.6216	
Lake-Sanders Cos.	6/29-7/4,57	26,928	--	26,928	8,883.36	--	7,579.35	16,462.71	0.6102	

(Continued)

COOPERATIVE RANGE GRASSHOPPER CONTROL OPERATIONS--ACREAGES SPRAYED AND COSTS (Continued)

Region WesternFiscal Year 1957

State and Location	Period of Control Operations	Acreage Sprayed		Total Acres Treated	C o s t s				Total Cost	Average Cost per Acre
		Contract Aircraft	Ground Equipment		States, Counties, & Landowners	Other Co-operating Fed. Agcys.	Plant Pest Control Division			
Montana										
Chouteau Co.	6/29-7/15, 57	4,500	--	4,500	-	--	\$3,099.23	\$3,099.23	\$3,099.23	\$0.6666
Big Horn Co.	6/24-7/27, 57	384,117	--	384,117	\$85,514.65	--	125,616.77	211,131.42	211,131.42	0.5496
Total		544,361	3,500	547,861	\$123,504.67	\$278.00	\$177,445.63	\$301,228.30	\$301,228.30	\$0.5498
Nevada										
Soldiers Meadows - Sheldon Game Refuge (Humboldt Co.)	7/16-8/18, 56	--	1,440	1,440	\$ 922.00	\$72.00	\$ 378.60	\$ 1,372.60	\$ 1,372.60	\$ 0.9532
Independence Valley-Maggie Cr.-Bull Run (Elko Co.)	7/1-8/4, 56	--	8,940	8,940	2,949.24	--	4,332.63	7,281.87	7,281.87	0.8145
Deeth Wells-Thousand Springs Red House (Elko Co.)	6/1-6/30, 57	--	8,240	8,240	2,166.00	--	3,472.48	5,638.48	5,638.48	0.6840
Total			18,620	18,620	\$6,037.24	\$72.00	\$8,183.71	\$14,292.95	\$14,292.95	\$ 0.7676
New Mexico										
Eagle Nest (Colfax Co.)	7/13-7/17, 56	22,646	--	22,646	\$9,511.96	--	\$4,123.91	\$13,635.87	\$13,635.87	\$ 0.6021
Des Moines (Union Co.)	7/21-7/30, 56	154,180	--	154,180	46,250.83	--	23,080.12	69,330.95	69,330.95	0.4497
Thomas Area (Union Co.)	7/21-7/31, 56	74,983	--	74,983	22,916.97	--	11,547.88	34,464.85	34,464.85	0.4596
Hondo Area (Lincoln Co.)	7/30-8/3, 56	44,021	--	44,021	11,374.18	--	11,980.27	23,354.45	23,354.45	0.5305

(Continued)

COOPERATIVE RANGE GRASSHOPPER CONTROL OPERATIONS--ACREAGES SPRAYED AND COSTS (Continued)

Region Western

Fiscal Year 1957

State and Location	Period of Control Operations	Acreage Sprayed		Total Acres Treated	C o s t s			Total Cost	Average Cost Per Acre
		Contract Aircraft	Ground Equipment		States, Counties, & Landowners	Other Co-operating Fed. Agcys.	Plant Pest Control Division		
New Mexico									
Raton Area (Colfax Co.)	8/14-8/18,56	19,486	---	19,486	\$5,699.82	---	\$2,849.59	\$8,549.41	\$0.4387
Sedan (Union Co.)	6/22-6/25,57	32,554	---	32,554	10,139.90	---	5,070.08	15,209.98	0.4667
Arch (Roosevelt Co.)	6/19-6/26,57	28,652	---	28,652	10,199.61	---	5,145.74	15,345.35	0.5356
Nara Visa (Quay-Union Cos.)	6/29-7/20,57	60,408	---	60,408	18,243.04	---	9,316.25	27,559.29	0.456
Total		436,930	---	436,930	\$134,336.31	---	\$73,113.84	\$207,450.15	\$0.4747
Utah									
Fishlake Nat'l Forest (Beaver Co.)	7/16-8/1,56	---	2,020	2,020	---	\$115.00	\$1,551.96	\$1,666.96	\$0.825
Promontory (Box Elder Co.)	6/29-7/3,57	40,780	---	40,780	10,065.56	---	8,178.67	18,244.23	0.447
Total		40,780	2,020	42,800	\$10,065.56	\$115.00	\$9,730.63	\$19,911.19	\$0.4652

(Continued)

COOPERATIVE RANGE GRASSHOPPER CONTROL OPERATIONS--ACREAGES SPRAYED AND COSTS (Continued)

Region WesternFiscal Year 1957

State and Location	Period of Control Operations	Acreage Sprayed		Total Acres Treated	C o s t s			Plant Pest Control Division	Total Cost	Average Cost Per Acre
		Contract Aircraft	Ground Equipment		States, Counties, & Landowners	Other Co-operating Fed. Agcys.				
Wyoming										
Bargee (Fremont Co.)	7/15-7/20, 56	21,980	---	21,980	\$ 3,932.48	---	\$10,444.29	\$ 14,376.77	\$0.6540	
1957 State Contract Including:										
Converse Park	6/15-8/8, 57	50,758	---	50,758	\$147,696.00	\$500.00	\$117,542.80	\$265,738.80	\$0.6000	
Sheridan Platte		56,920	---	56,920						
		101,110	---	101,110						
		40,170	---	40,170						
Natrona Crook		20,202	---	20,202						
Weston		59,099	---	59,099						
		16,720	---	16,720						
Fremont-Hot Springs		63,319	---	63,319						
Johnson		31,600	---	31,600						
Bighorn		3,000	---	3,000						
Total		464,878	---	464,878	\$151,628.48	\$500.00	\$127,987.09	\$280,115.57	\$0.6025	
Grand Total		1,842,772	36,902	1,879,674	\$524,024.12	\$1,198.00	\$538,308.37	\$1,063,530.49	\$0.5554	

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

COOPERATIVE RANGELAND CONTROL
DEPARTMENT OF AGRICULTURE LANDS
GRASSHOPPER CONTROL

Region Western

Fiscal Year 1957

STATE	AREA	Period of Control Operations	Land Ownership (Acres) Forest Service
Arizona	Santa Cruz Co. (Coronado Nat'l. Forest)	9/7-9/18, '56	28,968
Idaho	Lemhi Co. (Salmon Nat'l. For.) Clarke & Fremont Cos. (Targhee Nat'l. Forest)	7/1-8/3, '56	54,756
	Musselshell Co. (Lewis & Clark Nat'l. Forest)	7/3-7/13, '56	2,780
Montana	Wheatland-Meagher Cos. (Gallatin; Lewis & Clark Nat'l. Forest)	6/20-7/6, '57	5,848
	Chouteau Co. (Lewis & Clark Nat'l. Forest)	6/29-7/15, '57	4,500
Utah	Beaver County (Fish Lake Nat'l. Forest)	7/16-8/1, '57	2,020
	Park County (Two Dot) Shoshoni Nat'l. For. (Sunlight Basin)" "	6/26-7/10, '57	4,000
Wyoming	Sheridan Co. (Bighorn Nat'l. Forest)	6/26-7/10, '57	300
	Johnson Co. (Bighorn Nat'l. Forest)	6/26-8/8, '57	13,800
	Bighorn Co. (Bighorn Nat'l. Forest)	6/26-8/8, '57	1,500
Total		6/26-8/1, '57	3,000
			121,472

COOPERATIVE RANGELAND CONTROL - VETERANS ADMINISTRATION LANDS

STATE	AREA	Period of Control Operations	Land Ownership (Acres) Forest Service
Wyoming	Sheridan Co. (Ft. McKenzie-Vet's Hospital Farm)	6/26-7/15, '57	1,240
Total			1,240

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

COOPERATIVE RANGELAND CONTROL
DEPARTMENT OF INTERIOR LANDS

GRASSHOPPER CONTROL

Region Western

Fiscal Year 1957

STATE	AREA	Period of Control Operations	Land Ownership (Acres)			Indian Service	Total Acres Treated
			BLM	Reclam- ation	Fish and Wildlife Service		
California	Tulelake Area - Siskiyou Co.	7/17-'56	--	--	1,150	--	1,150
	Bear River - Humboldt Co.	7/1-7/14, '56	--	--		1,850	1,850
Colorado	Fremont Co. (Canon City)	6/28-7/6, '57	1,000	--	--	--	1,000
Idaho	Lemhi Co.	7/1-7/15, '56	6,285	--	--	--	6,285
	Beaverhead Co. (Red Rock Lake Refuge)	7/1-7/16, '56	--	--	1,000	--	1,000
Montana	Musselshell Co.	7/1-7/13, '56	22,765	--	--	--	22,765
	Blaine Co. (Ft. Belknap Ind. Res.)	7/31-8/12, '56	--	--	--	2,500	2,500
	Lake-Sanders Cos. (Flathead Ind. Res.)	6/29-7/4, '57	--	--	--	9,518	9,518
	Big Horn Co. (Crow Ind. Res.)	6/24-7/27, '57	--	--	--	301,451	301,451
	Blaine Co. (Ft. Belknap Ind. Res.)	6/29-7/4, '57	-	--	--	14,903	14,903
Nevada	Elko Co. (Soldiers Meadow- Sheldon Game Refuge)	7/6-8/18, '56	--	--	700	--	700
	Elko Co. (Deeth Wells, Thousand Springs, Red House)	6/1-6/30, '57	5,200	--	--	--	5,200
New Mexico	Union Co. (Thomas)	7/21-7/31, '56	200	--	--	--	200
	Lincoln Co. (Hondo)	7/30-8/3, '56	11,877	-	-	--	11,877
Wyoming	Fremont-Hot Springs Cos. (Wind River Ind. Res.)	7/14-7/20, '56	--	--	--	15,180	15,180
	Park Co. (Cody)	6/15-8/8, '57	339	4,860	--	--	5,199
Total	Fremont-Hot Springs (Wind River Ind. Res.)	6/15-8/8, '57	--	--	--	44,619	44,619
			47,666	4,860	2,850	390,021	445,397

VOLUNTARY AND COOPERATIVELY FINANCED GRASSHOPPER CONTROL,
ESTIMATES OF ACRES PROTECTED, LOSS IN DOLLARS, AND SAVINGS IN DOLLARS
AS REPORTED BY STATES
1956 GROWING SEASON

GRASSHOPPER CONTROL

States	VOLUNTARY CONTROL			COOPERATIVELY FINANCED CONTROL		
	Protected (Acres)	Loss Caused (Dollars)	Savings From Control (Dollars)	Protected (Acres)	Loss Caused (Dollars)	Savings From Control (Dollars)
Arizona	1,300	*	*	114,789	*	*
California	524,361	366,700	3,126,011	55,644	*	711,840
Colorado	132,000	2,900,000	2,707,000	236,051	1,900,000	705,000
Idaho	24,100	86,950	94,300	169,114	30,000	69,000
Montana	591,000	1,611,000	1,377,000	29,045	26,000	62,000
Nevada	*	*	*	78,000	*	25,000
New Mexico	30,650	*	352,475	671,617	*	1,493,524
Oregon	7,928	81,000	74,800	-	-	-
Utah	280,520	225,265	245,185	236,756	275,955	185,200
Washington	1,000	1,000	75,000	-	-	-
Wyoming	138,330	239,850	164,065	388,400	2,079,000	746,450
Total	1,731,189	5,511,765	8,215,836	1,979,416	4,310,955	3,998,014

* Reports Incomplete

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

VOLUNTARY CONTROL - ESTIMATED ACREAGES OF LAND TREATED
AND INSECTICIDES USED AS REPORTED BY STATES - 1956 GROWING SEASON

GRASSHOPPER CONTROL

Region Western

State	Acres	Insecticide	Form Used
Arizona	1,300	Aldrin	Spray
California	524,361	Aldrin, Heptachlor, TEPP, Dieldrin, Toxaphene, Chlordane, DDT	Spray, bait, and dust
Colorado	132,000	Aldrin, Dieldrin, Heptachlor, Chlordane, Toxaphene	Spray
Idaho	9,500	Aldrin, Dieldrin, Chlordane, Parathion	Spray and dust
Montana	125,000	Dieldrin, Heptachlor, Sodium fluosilicate	Spray and bait
Nevada*	-	-	-
New Mexico	20,800	Aldrin, Toxaphene, Chlordane, Dieldrin	Spray
Oregon	7,928	Aldrin, Chlordane, Toxaphene	Spray and dust
Utah	124,384	Aldrin, Dieldrin, Toxaphene, Chlordane, Heptachlor, Sodium fluosilicate	*
Washington	1,000	Aldrin	Spray
Wyoming	35,447	Aldrin, Chlordane	Spray and bait
Total	981,720		

*Information incomplete.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

EXPENDITURES BY SOURCE AND ACTIVITY
GRASSHOPPER CONTROL

Fiscal Year 1957

Region Western

	1	2	3	4	5	6	7	8
	Planning & Direction	Technical Assistance	Survey	Control	Regula- tory	Methods Improvement	Other	Total
Source of Cash & Equivalent*	\$	\$	\$	\$	\$	\$	\$	\$
Plant Pest Con- trol Division	78,000.00	75,000.00	92,000.00	538,000.00		12,000.00	5,000.00	800,000.00
Other Organizations								
States	2,505.00	1,200.00	127.00	166,778.77			17.16	170,627.93
Counties	6,250.00	11,000.00	4,500.00	33,127.20				54,877.20
Ranchers				328,933.27				328,933.27
Indian Councils				3,485.52				3,485.52
Subtotal-Other Organizations	8,755.00	12,200.00	4,627.00	532,324.76			17.16	557,923.92
Total (of PPC & Other)	\$ 86,755.00	\$ 87,200.00	\$ 96,627.00	\$ 1,070,324.76	\$	\$ 12,000.00	\$ 5,017.16	\$ 1,357,923.92
Contributed Services**								
Depts. of Agri.	11,974.00	8,500.00	5,375.00	450.00	300.00	200.00	200.00	26,999.00
State Experiment Stations	1,100.00	2,900.00	1,050.00			23,385.00	800.00	29,235.00
Counties	12,950.00	10,000.00	13,450.00	18,700.00			1,440.00	56,540.00
Ranchers	2,550.00		700.00				100.00	3,350.00
Extension Service	2,700.00	5,400.00	4,040.00	1,340.00		450.00		13,930.00
Other Fed. Agencies	200.00	100.00	2,643.00	2,016.19			100.00	5,059.19
Towns or Cities							100.00	100.00
Total	31,474.00	26,900.00	27,258.00	22,506.19	300.00	24,035.00	2,740.00	135,213.12
Grand Total	\$118,229.00	\$114,100.00	\$123,885.00	\$1,092,830.95	\$ 300.00	\$36,035.00	\$7,757.16	\$1,493,137.11

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division
COOPERATIVE AID RECEIVED

Fiscal Year 1957

GRASSHOPPER CONTROL

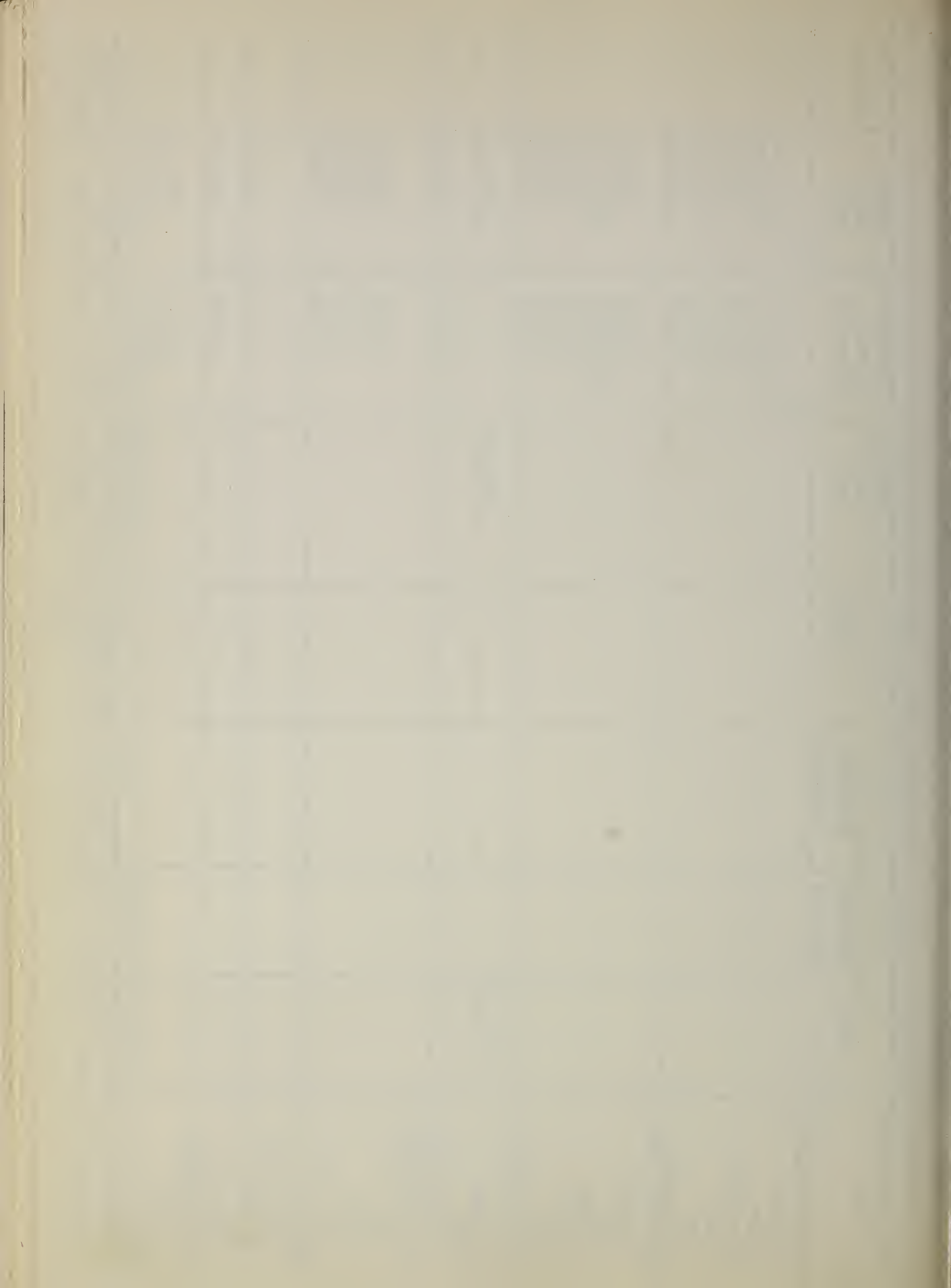
Region Western

State and Source of Aid	1		2		3		4		5		6		7		8	
	Cash		Personal Services		Equipment & Supplies		Space		Total of Cash & Equiv.		Intangible Service Estimate**		Source Grand Total		Remarks	
State Depts. of Agric.	\$		\$		\$		\$		\$		\$		\$			
Arizona	15,202.65		482.00		17.16				15,701.81		1,000.00		16,701.81			
California											8,850.00		8,850.00			
Colorado	1,230.00								1,230.00		4,200.00		5,430.00			
Idaho	4,946.00		150.00						5,096.00		500.00		5,596.00			
Montana	--		-		--				--		-		--			
Nevada	3,537.24								3,537.24		4,325.00		7,862.24			
New Mexico	67,374.63								67,374.63		6,000.00		73,374.63			
Oregon											250.00		250.00			
Utah	2,219.05								2,219.05		124.00		2,343.05			
Washington											250.00		250.00			
Wyoming	72,269.20		3,200.00						75,469.20		1,500.00		76,969.20			
Counties																
California	25,490.59		21,750.00						47,240.59		48,500.00		95,740.59			
Colorado											4,940.00		4,940.00			
Idaho	720.00								720.00				720.00			
Utah	2,615.50								2,615.50				2,615.50			
Wyoming	4,301.11								4,301.11		3,100.00		7,401.11			
Ranchers																
Arizona	20,395.72								20,395.72				20,395.72			
California	39,250.62								39,250.62				39,250.62			
Colorado	1,228.20								1,228.20				1,228.20			
Idaho	3,800.00								3,800.00				3,800.00			
Montana	120,019.15								120,019.15				120,019.15			
Nevada	2,500.00								2,500.00				2,500.00			
New Mexico	66,961.68								66,961.68		2,550.00		69,511.68			
Oregon											500.00		500.00			
Utah	5,231.01								5,231.01				5,231.01			
Washington											200.00		200.00			
Wyoming	69,546.89								69,546.89		100.00		69,646.89			

1		2		3		4		5		6		7		8	
State and Source of Aid	Cash and Equivalent Aid*				Total of Cash & Equiv.	Intangible Service Estimate**	Source Grand Total	Remarks							
	Cash	Personal Services	Equipment & Supplies	Space											
Extension Service	\$	\$	\$	\$	\$	\$	\$								
Colorado								2,550.00							
Idaho								6,140.00							
New Mexico								950.00							
Oregon								2,400.00							
Utah								140.00							
Washington								1,750.00							
Experiment Sta.															
Colorado								750.00							
Idaho								5,135.00							
Montana								22,600.00							
Oregon								150.00							
Utah								450.00							
Washington								150.00							
Indian Councils															
Montana	3,485.52				3,485.52			3,485.52							
Cities															
Bufalo, Wyo.						100.00		100.00							
Other Fed. Agcys.															
USDA-For. Serv.															
Idaho						350.00		350.00							
Oregon						500.00		500.00							
Utah						115.00		115.00							
Washington						100.00		100.00							
USDI															
Fish & Game															
Montana						153.00		153.00							
BIM															
Washington						100.00		100.00							
Indian Service															
Montana						825.00		825.00							
Wyoming						2,916.19		2,916.19							
Total	532,324.76	25,582.00	17.16		557,923.92	135,213.19		693,137.11							

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual/

** Limited to services incidental to other activities for which only an estimated value is available./cash expenditure.



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division
SUMMARY OF ASSOCIATED ACTIVITIES
GRASSHOPPER CONTROL

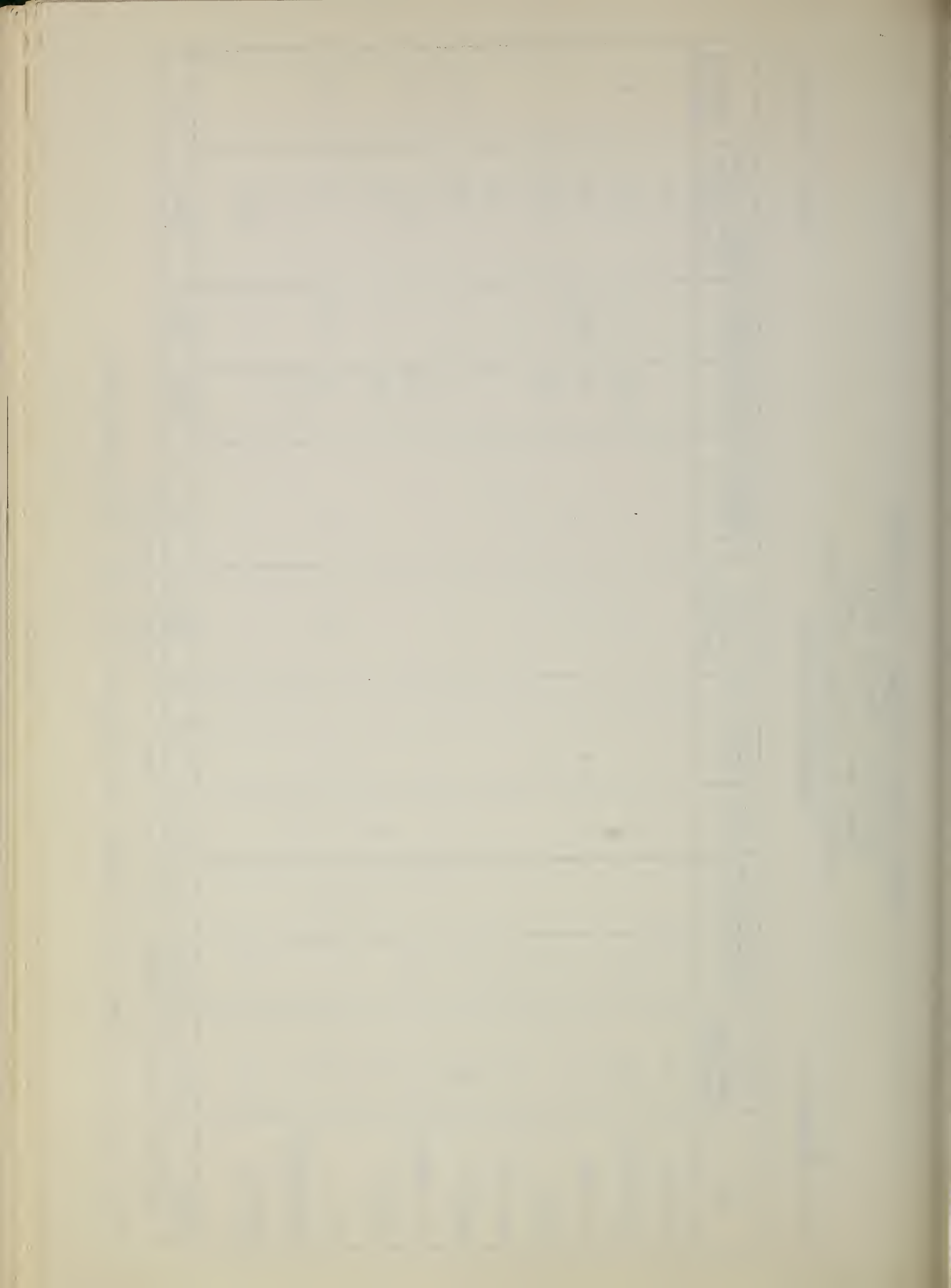
Region Western

Fiscal Year 1957

Area	Public Meetings Attended	P r e s e n t a t i o n s					Feature & News Stories*	Extent These Aids Were Used**			Special Reports
		Talks	Slides	Films	Radio	TV		Exhibits	Bul.*	Cir.*	
Arizona	4	4								300	
California	10	10		1			50	4500		250	5
Colorado	22	19		5	4		30	120	500	75	
Idaho		5			2		5	200		120	
Montana	17	16								10	
Nevada	10	4								53	11
New Mexico	14	14						125		110	1
Oregon	3			2				100		25	
Utah	10	8	6	4	1		15	34	20	32	3
Washington	1			1				100		25	
Wyoming	11	3								100	
Total	102	83	6	13	7		100	5179	520	1100	20

* Written by Federal personnel for release direct or through cooperators.

** This should be a conservative estimate (accurate record for these items impractical).



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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
CENTRAL REGION

ANNUAL PROGRAM REPORT

GYPSY MOTH

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
In cooperation with
State, County, and Local Agencies

October 21, 1957
Minneapolis, Minn.

R. O. Bulger
Regional Supervisor

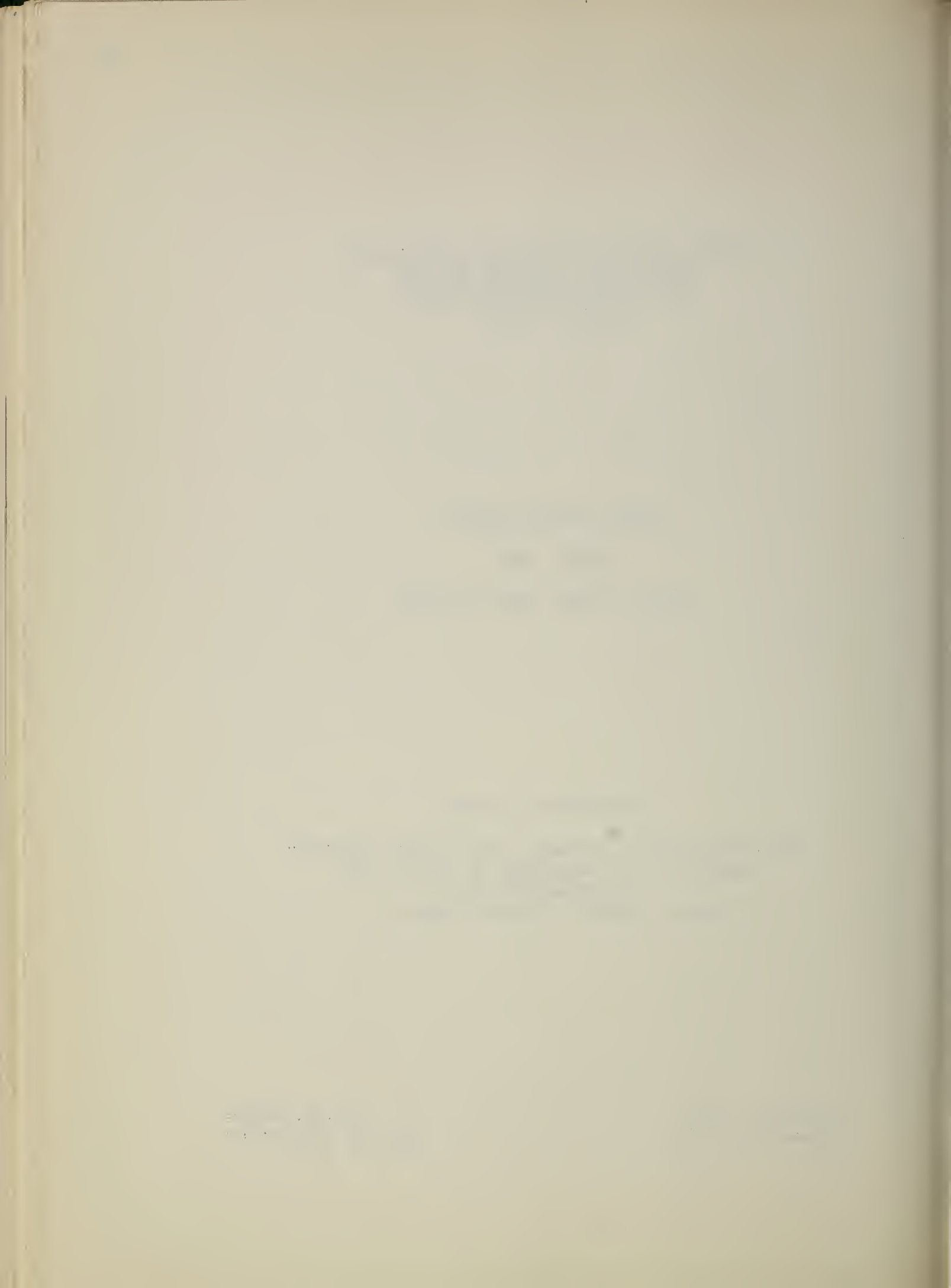


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I. INTRODUCTORY

A. Statement of Problem

The over-all problem is the eradication of a destructive tree-defoliating insect pest, to keep it from becoming widespread in the Central Plant Pest Control Region. The gypsy moth is a defoliator of shade-, forest-, and fruit trees, and of ornamentals. Repeated defoliation of the plants will eventually cause them to die. The natural spread of the moth is normally quite slow, as only the males can fly. The females are heavy-bodied and, since they cannot fly, they lay their eggs close to the place where they issued as moths. Newly hatched larvae may be dispersed by strong winds. Long-distance spread of this insect may occur as a result of egg masses being deposited on timber products, quarry blocks, Christmas trees, nursery stock, and the like.

B. Program Justification Statement

At present Michigan has the only known gypsy-moth infestation in the Central Plant Pest Control Region. By means of adequate control programs in the area, there is a very good chance that complete eradication of this pest may be brought about, thus preventing its spread.

C. Program Objective

The objective is to determine the prevalence of the gypsy moth through visual observations and extensive trapping, and to eradicate the pest when found.

D. Changes in Work Plans

None.

E. Status of Infestation

The original gypsy-moth infestation in Michigan was found in May 1954. The infestations that were located by visual survey at that time and by trapping programs conducted in 1954, 1955, and 1956 have been treated with 12½-percent DDT in oil, applied at the rate of one gallon per acre. The application of the chemical was made by aircraft. To date, 240,110 acres have been treated with DDT. In 1956 only two male moths were trapped in the 5,000 traps that were used in 2,259 square miles of timbered country.

II. PROGRAM HISTORICAL INFORMATION

Until recently, the gypsy moth was known to occur only in the New England States, Pennsylvania, and eastern New York. An outlying infestation in northern Ohio was found and eradicated. In 1954, a similar infestation was found at Lansing, in Ingham County, Michigan, and later across the line in Eaton County. Each year since then surveys have been made in the area and control measures taken where necessary.

III. PROGRAM ACTIVITY

A. Planning and Direction

The planning and direction of the gypsy-moth program is the joint responsibility of the U. S. Department of Agriculture and the State Departments of Agriculture.

B. Technical Assistance

Technical assistance will be provided by the Entomology Departments of the State Departments of Agriculture and the State Universities. Plant Pest Control personnel provide the technical direction for trapping and control operations.

C. Survey

Surveys for the gypsy moth are both by visual observation and by trapping male moths. Traps are placed in areas known to have had previous infestations, as well as in locations which have received articles from areas known to be infested. In addition to the surveys made in Michigan, some traps were placed in northern Indiana.

D. Control

Control work was done in Michigan during the period of May 5-23, 1957, on 18,880 acres of forested land. Of this total, 14,720 acres of private land were located in Eaton County and 2,560 acres of private and 1,600 acres of state land in Clinton and Shiawassee Counties. The State spent \$5,123.00 on the program and the Plant Pest Control Division \$5,096.25. The average per-acre cost was 54 cents. The entire acreage was treated with 12 $\frac{1}{2}$ -percent DDT in fuel oil. The insecticide was applied by aircraft.

E. Regulatory

There is no regulatory program in this region. However, all reports of products coming into the Central Plant Pest Control Region without proper certification from known infested areas are checked upon.

F. Methods Improvement

The survey and control methods now employed appear to be adequate.

G. Other

1. Cooperation

- a. The Plant Industry Division, Michigan State Department of Agriculture, in cooperation with the Plant Pest Control

Division, provides supervision and technical direction for the over-all program, including the informational activities, and furnishes funds for control operations and the employment of field supervisors and labor. (See table 1.)

2. Associated Activities

a. Program servicing (See table 2.)

b. Recommendations

None.

Table 1. - Gypsy Moth Survey - Fiscal Year 1957

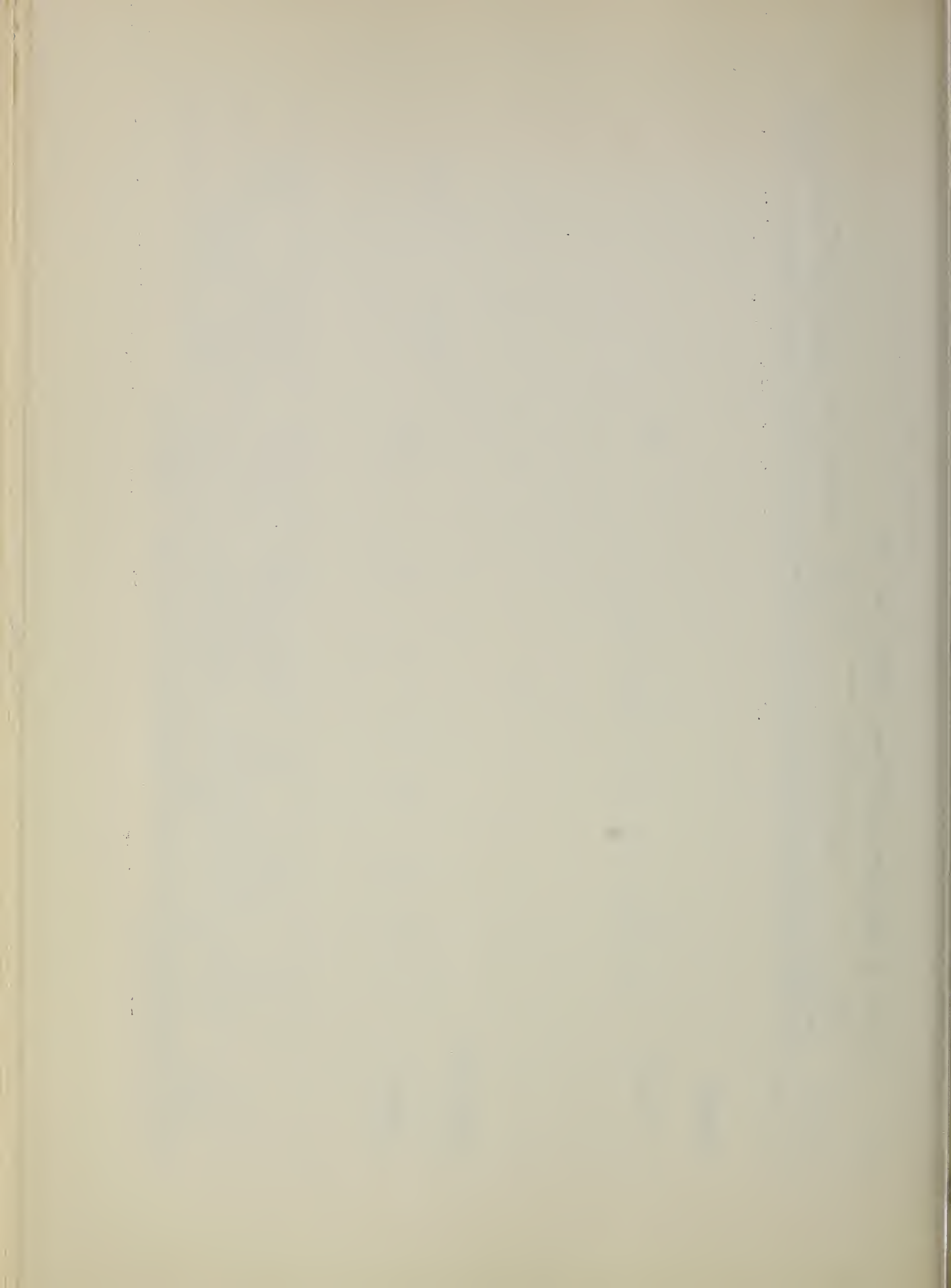
State	Survey									
	Number	No. Locations	Where:	Infestations						
	Traps	in	Adult Moths Trapped:	Confirmed by						
	Use	Regulated	Other	Inspection	Federal	Contract	State and	Private	Total	
	Areas	Areas	Number	Number	Contract	Contract	Private	Private	Acres	Acres
Indiana	50	-	-	-	-	-	-	-	-	-
Michigan	8,668	-	2	-	-	-	18,880	18,880	18,880	18,880
Totals	8,718	-	2	-	-	-	18,880	18,880	18,880	18,880

(No shippers serviced; no service calls.)

Table 2. - Summary of Associated Activities - Fiscal Year 1957

State	Public : : Meetings: : Attended:	Talks: : Slides: : Films:	Radio: : TV	Feature: : & News: : Stories:	Exhibits: : tings*:	Extent These Aids Were Used** : : Bulle-:-Circu-:-Infest. Maps: : lars*:& Posters	Special : Reports
<u>FEDERAL</u>							
Michigan	- 1	- -	- -	- -	- 300	- -	- -
- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
<u>COOPERATORS</u>							
Michigan	- 11	2 16	1 2	1 1	1 235	- -	- -
Totals	- 12	2 2 16	1 2	1 1	1 535	- -	- -

*Written by Federal personnel for release direct or through cooperators.
 **Conservative estimate.



Expenditure by Source and by Activity - Fiscal Year 1957

State	Planning & : : Direction	Technical : : Assistance	Survey : : Survey	Control : : Control	Regulatory : : Regulatory	Methods : : Improvement	Other : : Other	Total
<u>CASH & EQUIVALENT</u>								
Plant Pest Control Division	\$ 2,000.00	\$1,000.00	\$5,000.00	\$ 5,000.00	\$1,000.00	-	-	\$14,000.00
- - - - -	-	-	-	-	-	-	-	-
Other Organizations:								
Ind.	-	-	1,488.00	-	-	-	-	1,488.00
Mich.	36,000.00	100.00	300.00	7,582.00	-	-	-	43,982.00
Wis.	-	-	-	-	-	-	-	-
Subtotals	\$36,000.00	\$ 100.00	\$1,788.00	\$ 7,582.00	-	-	-	\$45,470.00
- - - - -	-	-	-	-	-	-	-	-
<u>CONTRIBUTED SERVICES</u>								
Ind.	-	-	-	-	-	-	-	-
Mich.	-	-	3,000.00	-	-	-	-	3,000.00
Wis.	-	-	-	-	-	-	-	-
Subtotals	-	-	\$3,000.00	-	-	-	-	\$ 3,000.00
- - - - -	-	-	-	-	-	-	-	-
GRAND TOTALS	\$38,000.00	\$1,100.00	\$9,788.00	\$12,582.00	\$1,000.00	-	-	\$62,470.00

Cooperative Aid Received - Fiscal Year 1957

State	Cash and Equivalent Aid*			Total of			Intangible			Source			Remarks
	Cash	Personal:	Equipment	Cash &	Cash &	Equiv.	Service	Estimate**	Total	Grand	Total		
Indiana		\$1,488.00	0	0	\$ 1,488.00		0		\$ 1,488.00				
Michigan	\$43,682.00	0	0	0	43,682.00	\$3,000.00			46,682.00				
Totals	\$43,682.00	\$1,488.00	0	0	\$45,170.00	\$3,000.00			\$48,170.00				

*Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

**Limited to services incidental to other activities for which only an estimated value is available.

Revised

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
EASTERN REGION

ANNUAL PROGRAM REPORT

GYPSY MOTH

July 1, 1956 - June 30, 1957

COOPERATING AGENCIES:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
and
State Departments of Agriculture
Conservation and Forestry

December 1957
Moorestown, New Jersey

H. L. Smith
Regional Supervisor

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Gypsy Moth Quarantine No. 45 and
Canadian Quarantine - FY 1957

I. INTRODUCTORY

A. Statement of Problem

The gypsy moth is a leaf-feeder, preferring hardwoods, but under outbreak conditions, it attacks almost all species of leafy plants. Single defoliations usually result in the death of certain conifers. Successive defoliation kills many species, retards growth, or weakens the trees to the extent that secondary insects, diseases, or unfavorable ecological conditions will kill them. In addition to timber losses, other resulting damages include reduced water levels, erosion, fire hazards, loss of wildlife cover, etc.

The problem during the current year was a continuing effort to prevent spread of the gypsy moth from infested areas - plus the execution of a large-scale spray program, inaugurated on a smaller scale the preceding year, aimed at eradicating the insect from a wide belt of territory along the periphery of infestation in New York, Pennsylvania and New Jersey. This entailed the enforcement of Federal-State quarantines; surveys to detect and determine outer limits of infestation; the application of spray treatments to eradicate infestations outside the area of general infestation and from a wide peripheral area; and, the application of control treatments in sections of heavy infestation within the area of general infestation to prevent defoliation and minimize spread.

B. Program Justification Statement

Unprecedented spread of the insect to the west and south in New York, Pennsylvania and New Jersey occurred during the years 1952 to 1954 as a result of epidemic outbreaks and favorable winds during that period. In the absence of aggressive measures to eliminate the insect from such outlying and peripheral areas of infestation, continuing further spread could be expected during succeeding outbreak years. Particularly threatened are the extensive and valuable hardwood forests in the Allegheny and Appalachian regions beyond the south-western limits of present infestation. The presently known infested area represents less than 3% of the total area of the United States.

C. Program Objective

To prevent further spread of the moth into non-infested sections of the country by survey, control and regulatory measures; and to eliminate the moth from a wide belt of territory along the periphery of infestation as the first step in an all-out eradication effort. The program is also designed to prevent defoliation and damage to woodlands by application of timely control treatments to heavily infested areas within the area of general infestation.

D. Changes from Work Plans

It was necessary to eliminate spraying of orchards and their immediate vicinities in the Lower Hudson River Valley late in the spray season to avoid possible spray damage to set fruit. Borders around reservoirs of the New York City Water Commission were also left untreated.

In Pennsylvania, it was necessary to expand the trapping program to delimit an infestation found early in July, in the Town of Dennison, Luzerne County.

E. Status of Infestation

An extensive trapping survey was conducted in 1956 outside the regulated area for the purpose of delimiting infestation, and within sprayed areas to check effectiveness of the spray program. This survey followed by scouting during the winter months disclosed a few spots of very light infestation in this peripheral area. No infestations were indicated or found near the outer limits of the area trapped. A few moth recoveries within the area sprayed in New York and New Jersey indicated a need for additional mop-up spraying in these spots. Recovery of several male moths in traps employed by the Canadian Department of Agriculture in an area bordering the New York-Vermont state line indicated infestation in that area, however, subsequent scouting revealed only one egg cluster.

Surveys conducted within the generally infested area indicated a further reduction of gypsy moth populations, however, heavy populations persisted in some sections, particularly in northwestern Connecticut and in the eastern sector of the Upper Hudson River Valley. The continuation of large-scale suppression spraying in heavily infested areas, together with heavy mortality of eggs and larvae due to extreme low temperatures reduced infestations to very low population levels. Considerable winter kill of eggs above snow line occurred during the winter due to extreme low temperatures in most northern sections. Killing frosts after egg hatching caused heavy mortality of larvae throughout most of the area, including some southern sections in New York and Connecticut.

Severe mortality of the overwintering larvae of the brown-tail moth occurred in Maine, and no doubt in other northern sections.

II. Program Historical Information

The gypsy moth was brought to Medford, Massachusetts from Europe in 1869 by a French scientist in an unsuccessful attempt to interbreed it with the silkworm. The insect escaped and became firmly established in that region. Spread of the moth was gradual; however, by 1905 approximately 4000 square miles were infested. For many years, control and quarantine programs confined the infestation within New England. By 1922, it reached New York, and following the hurricane of 1938 farther spread occurred. Isolated infestations appeared occasionally in outlying areas beyond the western limits of general infestation; these were eradicated.

Greatest spread of the moth occurs during epidemic outbreaks. During a period of high population density in New England in 1953 and 1954, spread to the south and west was much greater than during any previous outbreak period. Surveys revealed a general widespread infiltration to the west of the leading edge of infestation in New York, New Jersey and Pennsylvania. This new situation posed a serious threat of continued spread to important hardwood forests further to the south and west. Control and quarantine programs that had successfully held the moth in check for so many years were no longer adequate.

The problem was subsequently considered by the Council of State Governments - the Association of Commissioners, Directors and Secretaries of Agriculture - and the National and Regional Plant Boards. This wide interest culminated in a conference in Washington on March 6, 1956 when representatives from 15 states met with Department of Agriculture officials to consider the future of the program. There was general agreement that the quarantine should be continued and control measures be applied within the area of general infestation to prevent damage; and it was concluded that an effort be made to effect eradication of the gypsy moth from the United States. Subsequently, Congress provided Federal funds to cooperate with the States in financing a program on this basis.

The first phase of the eradication program was initiated in 1956 when more than 686,000 acres were aerially sprayed in the tri-state area of New York, Pennsylvania and New Jersey and in Michigan. This was supplemented by the additional treatment of 244,000 acres in New York and New England to suppress the moth at various outbreak centers. The eradication effort was expanded in 1957 when over 3 million acres were sprayed in the tri-state peripheral area, and an additional 18,000 acres were sprayed in Michigan. In New England and eastern New York, more than 400,000 were sprayed for suppression of infestation to prevent defoliation and damage.

III. Program Activity During Fiscal Year

A. Planning and Direction

All phases of the program are planned cooperatively by the Plant Pest Control Division and State Agencies involved, with industry and research groups participating. Area Supervisors work with the Regional Staff in planning. General field direction is by the Area Supervisors and their assistants, and direct supervision of the work is by District Supervisors.

B. Technical Assistance

State and Federal research units and industry participated in cooperative tests and studies to develop and improve methods and procedures applicable to control and regulatory activities. Major emphasis was in connection with problems associated with the large scale eradication program.

Technical assistance and demonstrations were furnished to cooperating state and local agencies on all phases of the work; and to growers, manufacturers and shippers concerned with quarantine requirements.

C. Surveys

1. Trapping

Trap surveys were conducted principally to determine the south-west limits of infestation in New Jersey, Pennsylvania and New York. Limited trapping was also conducted outside the regulated areas in Vermont, New Hampshire and Maine to delimit infestation to the north and east. The tri-state area in New York, Pennsylvania and New Jersey sprayed in 1956 was also trapped to determine the effectiveness of the spraying.

A modified pattern of trap placement was employed throughout most of the area trapped. This method differs from the true diamond grid pattern in that full use is made of all available roads and trails, keeping walking distances and time to a minimum. In view of the recent extensive spread, it was considered essential to cover as much territory as possible to determine the outer limits of infestation. An endeavor was made to maintain specific distances between traps (7/8 mile) but full coverage was not necessarily obtained, particularly in rough mountainous country where very few roads and trails exist.

A total of 16,368 traps were employed to survey approximately 8,000,000 acres of territory along the periphery of the infested area and in the 1956 spray area. In New York where a total of 10,734 traps were used, 368 male moths were captured in 168 traps in 56 towns. A concentration of trap captures were made in a group of towns immediately inside and outside the quarantine line in Otsego and Chenango Counties. Moths were also taken in only 10 other scattered towns further to the south and west of this concentration. Only four scattered traps attracted moths in Clinton and Franklin Counties. The pattern of recoveries would indicate that the recent general spread in a westerly direction in New York had been delimited. Moths were also trapped at some 5 locations within the sprayed area. In Pennsylvania 2671 traps were set in the counties of Monroe, Pike, Susquehanna and Wayne, in the northeast section of the state, including the area sprayed in 1956. Thirty-two of the traps attracted 138 moths in 13 towns. Most of the trap catches were in towns immediately south and west of the area sprayed in 1956. Scattered isolated catches near the outside limits of the area trapped would indicate that infestation was not delimited. No moths were caught in traps set in the 1956 spray area. In New Jersey 2000 traps were employed to survey the northwestern section of the state, including the 1956 spray area. Outside the sprayed area, 23 traps attracted 30 moths at scattered locations in 15 towns. Six of the attracting traps, 2 with multiple catches, were in the town of Sandyston in Sussex County. All other attracting traps caught single moths, including the four in the sprayed area. In New England 63 traps, of 587 placed in Lamoille County and small sections of Franklin and Caledonia Counties in Vermont, attracted 71 moths. In New Hampshire where 98 traps were set in northern Coos County, one trap attracted a single moth. In Maine 9 traps attracted 41 moths in the town of Lincoln in Penobscot County, and 3 singles were caught in 3 adjacent towns. New egg clusters were found in Lincoln at time of trapping. Scattered light infestation was indicated outside the regulated area in Washington County, where 7 traps attracted 8 moths. No moths were caught in Franklin County.

In Canada, 300 traps were employed in an area about 5 to 8 miles deep, north of the New York-Vermont State line. Of this total, 51 traps caught 64 moths

2. Scouting

Limited scouting around sites of isolated trap captures outside the regulated area in New York disclosed no infestation. Only 5 infestations were found at isolated positive trap sites in Pennsylvania and 3 in New Jersey. No infestation was found at sites of trap captures in the sprayed area. Five small scattered infestations were found in the vicinity of attracting traps in Vermont, one in Maine and none in New Hampshire.

State pest control agencies in New England and New York conducted selective scouting surveys within the generally infested area to locate outbreak centers and to determine trends in population buildup. Information developed is primarily used to determine where control treatments are needed to prevent defoliation. Considerable area requiring suppressive treatments were mapped in the upper Hudson River Valley in eastern New York and in northwestern Connecticut.

3. Aerial surveys

Aerial surveys conducted by cooperating State agencies and Federal personnel in the summer of 1956 showed only 43,158 acres of defoliation, as compared with 52,061 acres in 1955. Most of the defoliation observed was in western sections of Connecticut and Vermont, and in eastern New York. Results are given in the following table:

SUMMARY OF GYPSY MOTH DEFOLIATION - FY 1957

SUMMER 1956

NUMBER OF ACRES DEFOLIATED AND THE DEGREE OF DEFOLIATION

<u>State</u>	<u>75-100%</u>	<u>Less than 75%</u>	<u>Total</u>
Connecticut	-	3458	3458
Maine	1720	5565	7285
Massachusetts	-	3830	3830
New Hampshire	-	9305	9305
New York	1810	4835	6645
Rhode Island	-	-	-
Vermont	<u>7255</u>	<u>5380</u>	<u>12635</u>
Totals	10785	32373	43158

4. Recommendations

Continue and expand trap surveys outside the regulated areas and inside the area sprayed to date to detect and delimit infestation.

Continue tests to develop more efficient traps and trapping procedures.

D. Eradication or Control

1. Eradication was the objective of the large-scale cooperating spray program conducted in the peripheral tri-state area of New York, Pennsylvania and New Jersey, and on Long Island. The area to be sprayed was divided into 6 Federal units and 1 State unit, with a supervisor in charge of each unit. Each unit was surveyed, both from the ground and air, to determine and record various hazards; to determine the number and types of planes needed; and, to estimate the gallonage required. Spray bid specifications were prepared and mailed to prospective bidders on March 14 and opened at the ERBO on March 28. About the same time, program information was released by all agencies concerned, and other public relations activities were launched.

Field headquarters for the entire Federal program were set up at Newburgh, N. Y., with a sub-headquarters established at the most strategically located airport within each unit. In New York, Unit 1 included all of Suffolk County and the eastern half of Nassau County on Long Island; Unit 2, east of the Hudson River, included all of Putnam and parts of Dutchess and Westchester Counties; Unit 3, immediately west of the Hudson River, included most of Rockland and Orange Counties and parts of Sullivan and Ulster Counties; Unit 5 included most of Sullivan and parts of Delaware and Ulster Counties; and Unit 6, embraced a sizeable block and scattered areas in Broome, Chenango, Cortland, Oneida and Otsego Counties. Unit 4 included two large blocks and 6 small isolated areas in Morris, Passaic, Sussex and Warren Counties in northern New Jersey, and one large block adjoining Pike County, Pennsylvania. The State Unit in Pennsylvania included a large block in Wayne County, bordering the Delaware River, and 6 small scattered isolated areas further to the south and west. Federal package contracts were awarded to three spray firms as follows: Lebanair Inc., Lebanon, Pa. - 500,000 gallons each in Units 1, 2 and 5; Roberts Aircraft, Boise, Idaho -400,000 gallons in Unit 3; and, Chris D. Stoltzfus, Coatesville, Pa. -300,000 gallons in Unit 4 (N. J. & Pa.) and 100,000 gallons in Unit 6 (N.Y.). Pennsylvania awarded its State package

contract to Aerial Agricultural Service of Montana, Geraldine, Montana for 100,000 gallons. All contracts specified that DDT oil solution meeting specifications be applied at the rate of 1 pound of DDT in one gallon of solution per acre.

All spray planes were checked for calibration and swath width by the Division's aircraft specialists, who remained throughout the program to observe operations from the air, and to check planes and pilots to insure compliance with contract specifications. CAA inspectors also checked planes and pilots for compliance with CAA regulations.

Due to man-power and vehicles available, starting dates for the various units were staggered so that men and equipment could be reassigned from completed or nearly completed units to later starting units. Unfortunately this did not work out as all contractors failed to start early units as scheduled, due to either lack of equipment or insecticide supplies, and spraying did not start until April 22. Lack of sufficient acceptable and licensed planes on the part of Lebanair particularly jeopardized the program, and it was necessary for that firm to subcontract work in Units 2 and 5.

Aircraft furnished by contractors on the whole operated efficiently and no serious operational difficulties occurred during the spray season. To obtain fast coverage, multi-engine planes were utilized to the greatest extent possible. Extensive areas of truck crops, orchards, reservoirs, open country with pasturelands, and other critical and hazardous areas, required the use of many small and more maneuverable planes with narrow swath widths. See Table 2 for types and number of planes used, number of flights, and gallonage applied by each type plane.

Helium-filled balloons were used extensively in marking flight strips, and in spotting hazardous critical areas requiring special precautions. Lack of sufficient man-power and vehicles prohibited as full coverage as desired in guidance of planes and in ground checking spray deposits. Two observation planes were available in each unit for observing spray application and for radio communications. These planes performed a very vital part in checking the performance of spray pilots, but they were too few in number to adequately observe the many spray planes in operation simultaneously.

Problems in public relations developed on Long Island and in the lower Hudson Valley among certain groups who oppose use of chemicals for pest control or who believe the spray endangers humans and wildlife. Due primarily to the late starting dates, it was not possible to complete spraying of orchard areas in the Hudson Valley by blossom time as planned. There was some fish kill, very little of a serious nature, in some of the many streams and ponds in the area sprayed.

A total of 2,584,408 gallons of DDT solution were applied on 3,005,929 acres of woodlands and open type terrain for eradication purposes under Federal and State of Pennsylvania contracts. See Table 1.

2. Control

Within the area of general infestation, State cooperating agencies applied spray treatments for the suppression of epidemic populations, to prevent defoliation and damage in woodlands and to minimize spread to other sections. Approximately 398,000 acres were so treated in various sections in New England and eastern New York. See Table 1.

In New Hampshire, a total of 80,239 brown-tail moth webs were cut and burned in 23 towns in 5 southeastern counties.

3. Recommendations

Initiate exploratory screening of insecticides and formulations effective in gypsy moth eradication.

Expand developmental work to improve application procedures and equipment.

Investigate possible use of aircraft tracking devices presently available.

Regulatory

The objective of this phase of the program is to prevent artificial spread of the moth into eradication sprayed areas and to non-infested sections of the country, by enforcement of the Federal quarantine and paralleling state quarantines where they apply. Quarantined areas in Pennsylvania and New Jersey are under State regulation only.

To provide maximum protection to areas sprayed for eradication in New York, Administrative Instructions designating areas under regulation, supplemental to the Federal Quarantine, were amended effective May 21, 1957. This amendment designated the area sprayed in New York and a lightly infested area contiguous thereto, as the Suppressive Area. The balance of the regulated area continued its classification as the Generally Infested Area. The amendment also placed under regulation 8 additional towns found infested in Penobscot County, Maine. The total area under Federal regulation at the end of FY 1957 was 63,357.8 square miles. Areas under State regulations in Pennsylvania and New Jersey totaled 1657 square miles.

With certain exemptions, the quarantine regulates the movement of (1) timber and timber products (2) plants having persistent woody stems and parts thereof, including Christmas trees (3) stone and quarry products and (4) any other products or articles exposed to infestation or found infested. Certificates may be issued for movement of regulated articles from quarantined areas under any of the following conditions: (1) when they have not been exposed to infestation; (2) when they have been inspected and found apparently free of infestation; (3) when they have been treated by approved methods; and (4) when grown, produced or stored in such manner that no infestation could be transmitted thereby. Limited permits may be issued for the movement of non-certified regulated articles to specified destinations for specified processing, handling or utilization.

Inspection and certification services were furnished to regulated industries, shippers and individuals throughout the year. State cooperators furnished part of the inspection force. During FY 1957 articles valued at \$22,325,297 were certified for movement from the area regulated under Federal Quarantine. Inspectors made 22,376 service calls during that period. See Tables 1, 3 and 4.

F. Pupae Collection

The objective of the pupae collection work is to obtain sex attractant for baiting of traps employed in extensive surveys to detect and delimit infestations, and in checking effectiveness of the spray program. The success of the eradication

program largely depends on surveys which must detect the last insect. The sex attractant is obtained by collecting female pupae in areas of heavy infestation, aging the emerging adults, clipping from virgin moths the rear abdominal tips which contain the sex glands, and chemically processing the tips into the attractant or lure.

An intensive preliminary survey of prospective pupae collection areas made in June resulted in locating two suitable collection areas: one in the general area of Sharon and Goshen in western Connecticut, and a smaller area in the vicinity of Glens Falls, New York. In the two areas, 1,700,510 pupae were collected - 1,444,560 in Connecticut and 255,950 in New York. A total of 764,900 tips were clipped from virgin females that issued from them.

To insure a good stockpile of sex attractant for expanding trapping surveys, pupae collections were also conducted in Yugoslavia and Spain, where 400,000 and 305,000 tips were obtained.

G. Methods Improvement

Operational improvements in methods and procedures in all phases of work were stressed. Two-way portable radio equipment was provided to facilitate communications and improve supervision in spray operations. Additional observation planes were provided. Program information was made available early through the various outlets and public relations activities were stepped up. Amended quarantine regulations provided for issuance of certificates of exemption for approved stone and quarry premises which permitted the movement of regulated articles from such premises without individual certificates. Use of rubber stamp certificates was increased and a new combination certificate was designed and issued.

H. Other

1. State pest control agencies cooperated in varying degrees in one or more phases of the work by furnishing man-power, vehicles, equipment, etc. Industry and individuals cooperated in the regulatory phase of the program. County and municipal agencies assisted with public relations activities.
2. Associated Activities and Service

The gypsy moth film and colored slides were shown to interested garden clubs, various civic and service groups, and school groups. Most showings were accompanied by talks.

Gypsy moth exhibits were displayed at several fairs, and bulletins and leaflets distributed to interested persons. An intensive publicity campaign was conducted prior to and during the spray program, spearheaded by the Division and Regional headquarters. The many news releases, both Federal and State, were widely distributed.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

GYPSY MOTH

FISCAL YEAR - 1957

TABLE 1 SUMMARY OF REGIONAL FIELD ACTIVITY

REGION - EASTERN

State and County	Survey				Infestations Confirmed by			Acres Sprayed			Certification Services		
	Number Traps In Use	No. Locations Adult Moths Regulated Areas	Where Trapped Other Areas	Inspection * Number	Acres	Federal Contract	State & Private	Total Acres	No. Ship. Serv.	Total Service Calls	Est. Value Products Certified		
Connecticut							54,874	54,874		1,012	\$ 1,467,679		
Delaware													
Maine	278		19	1			100	100		2,011	3,152,211		
Maryland													
Massachusetts							120,000	120,000		3,340	2,679,144		
New Hampshire	98		1				10	10		1,649	3,293,802		
New Jersey	2,000		27	3	9	189,425	2	189,427					
New York	10,734	131	37	5	8	2,578,954	195,463	2,774,417		10,054	7,672,502		
Pennsylvania	2,671		32	5	10	131,730	105,820**	237,550					
Rhode Island							27,655	27,655		449	299,236		
Vermont	587		63	5	6		30	30		3,861	3,360,723		
Virginia													
West Virginia													
TOTALS	16,368	131	179	17	28	2,900,109	503,954	3,404,063	**	22,376	\$22,325,297		

* Beyond generally infested area

** Up to 1400 commercial shippers and several hundred private individuals received quarantine services

***Eradication spraying - State and private spraying in all other states was for suppression.

TABLE 2
AIRCRAFT USED ON FEDERAL ERADICATION PROGRAM
GALLONAGE APPLIED AREA BY EACH TYPE

Type of Aircraft	No. Used	Average Load (gals.)	No. of Trips	Total gals. Sprayed
Fairchild C82	5	2075	226	469,235
Stearman - 450 hp	35	158	2860	452,583
Douglas B18	6	1019	426	434,008
Boeing B17	2	2618	103	269,745
Curtiss C46	3	1279	184	235,385
Grumman TBM	3	603	371	223,713
Boeing C97	2	3027	63	190,696
Douglas C47	1	1197	86	102,985
Douglas A20	1	910	72	65,579
Stearman - 220 hp	4	103	184	18,945
Piper Cub	3	101	146	14,766
Hiller Helicopter	<u>1</u>	<u>42</u>	<u>163</u>	<u>6,854</u>
TOTALS	66	-----	4884	2,484,494

Miles flown by Division pilots-----75,000

TABLE 3 ORIGIN AND DESTINATION OF SHIPMENTS FOUND INFESTED BY STATES - FY 1957

ORIGIN	COLLECTED PLANTS		FOREST PROD.			XMAS TREES		BOUGHS		SCRAP METAL		USED BLOCKING		TOTALS	
	SHP.	EC	SHP.	EC	L P	SHP.	EC	SHP.	EC	SHP.	EC	SHP.	EC	SHP.	EC L P
Conn.	2	8												2	8
Maine	2	3	1	1										3	4
N. H.	11	69				1	1	1	1			1	1	14	92
N. Y.	1	1	49	590	1 1					7	173			57	764 1 1
Vt.	4	11	1	1										5	12
Total	20	112	51	592	1 1	1	1	1	1	7	173	1	1	81	880 1 1

DESTINATION	COLLECTED PLANTS		FOREST PROD.			XMAS TREES		BOUGHS		SCRAP METAL		USED BLOCKING		TOTALS	
	SHP.	EC	SHP.	EC	L P	SHP.	EC	SHP.	EC	SHP.	EC	SHP.	EC	SHP.	EC L P
Canada			1	1										1	1
*Conn.	1	3												1	3
Md.	3	4												3	4
Mich.	1	2												1	2
N. J.			41	557		1	1	1	1	5	156			48	725
N. Y.	14	102								2	7			16	109
Ohio												1	1	1	1
Penna.	1	1	8	33	1 1									9	34 1 1
**			1	1										1	1
Total	20	112	51	592	1 1	1	1	1	1	7	173	1	1	81	880 1 1

* Interdealer shipment

SHP. - No. Shipments

EC - No. Egg Clusters

L - No. Larvae

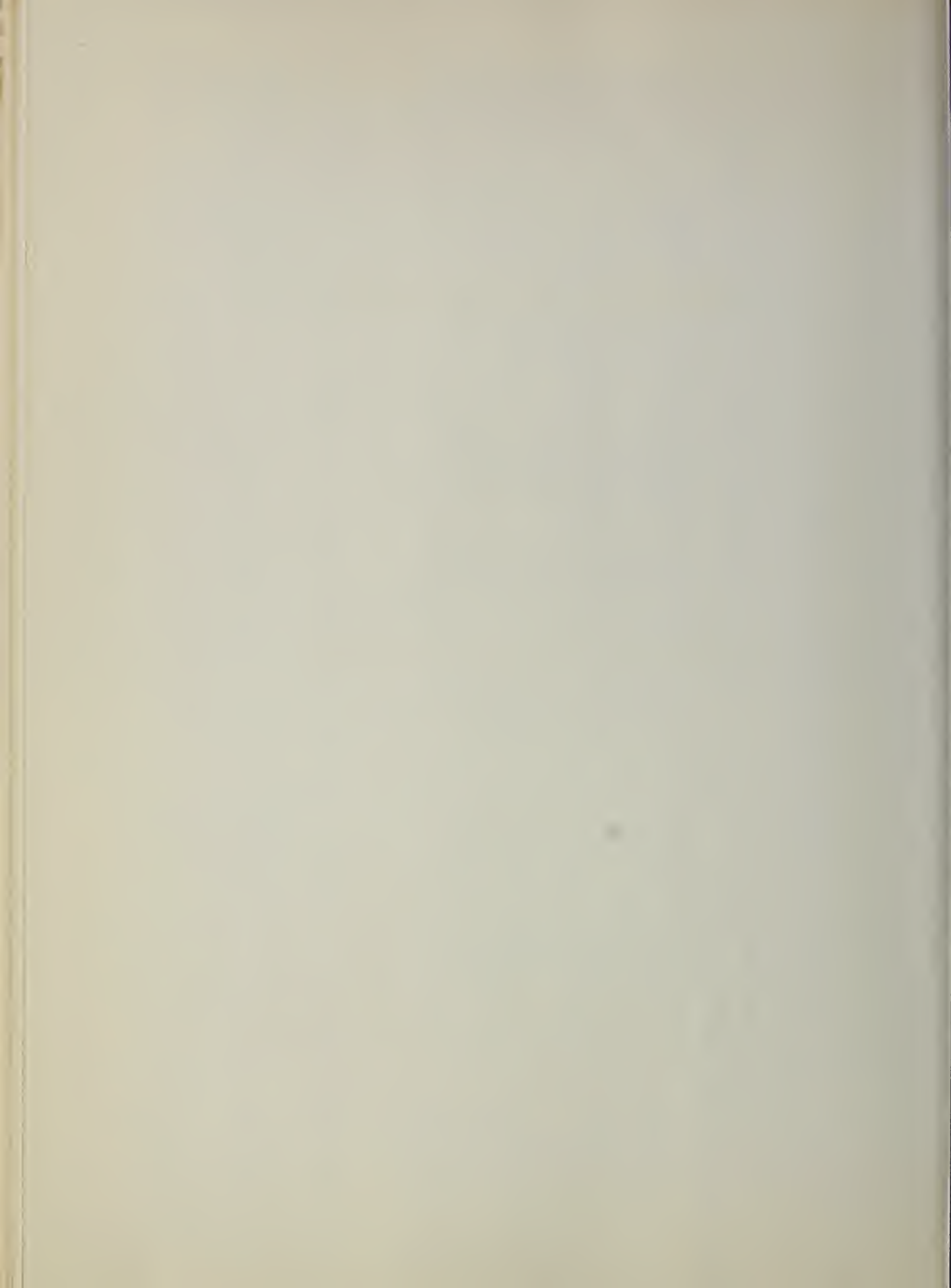
P - No. Pupae

**Unknown

TABLE 4
QUANTITIES OF PRODUCTS CERTIFIED UNDER GYPSY MOTH QUARANTINE NO. 45
AND CANADIAN QUARANTINE - FY 1957

QUARANTINE 45	CONN.	MAINE	MASS.	N. H.	N. Y.	R. I.	VT.	TOTALS
Lumber, Bd. Ft.	2,941,057	22,304,200	4,848,841	19,026,617	47,697,668	2,656,025	19,006,870	118,481,278
Logs, Poles, Posts	247	123,572	2,106	1,423,836	186,907		81,398	1,818,066
Wood, Cords	60	6,641	128	39	12,499		181	19,548
Cooperage, Bdls.	5,678	175	60,450	2,479	46			68,828
Misc. Forest Prod.	1,659	686	20,028	17,410	34,259		48,124	122,166
Nursery Plants	5,130,747	4,768,344	227,351	473,514	19,449,346	1,412,160	464,452	31,925,914
Cuttings, Pkgs.	953	10	3,035	12	6,590	140	70	10,810
Evergreen Trees, Cut	36	114,136	25,490	7,651	37,653	1	227,743	412,710
Boughs, Bls. Bags	4,821	2,853	26,150	4,919	34,795	656	26,098	100,292
Quarry Prod. Tons	2,879	561	6,422	8,828	6,309		22,605	47,604
Quarry Prod. Pcs.	87	58	4,872	72	31,680		10,856	47,625
Cable Reels	2,982	1,331	540	621	148		424	6,046
Scrap Metal Tons				13,288	16,573		4,565	34,426

CANADIAN QUARANTINE	CONN.	MAINE	MASS.	N. H.	N. Y.	R. I.	VT.	TOTALS
Lumber, Bd. Ft.		12,716,000					6,260,852	18,976,852
Logs, Poles, Pcs.		211,500					27,920	239,420
Logs, Bd. Ft.		76,902,000		4,243,000	3,127,898		16,265,616	100,538,514
Wood, Cords		216,207			9		5,648	221,864
Quarry Products, Tons		3,000			20		772	3,792
Quarry Products, Pcs.		42					6	48
Misc. Forest Prod.		230,344					57	230,401



HALL SCALE



PROGRAM ANNUAL REPORT



**UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION**

* _____ *

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION

ANNUAL PROGRAM REPORT

HALL SCALE

July 1, 1956 - June 30, 1957

Cooperating Agencies:

California State Department of Agriculture
Bureau of Entomology
Butte County Department of Agriculture
Yolo County Department of Agriculture

October 30, 1957
Oakland, California

Jim R. Dutton
Regional Supervisor



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INTRODUCTORY

Statement of Problem

The program of Hall Scale eradication for the current year has been directed towards a continuing schedule of inspection and treatment in planned eradication of the insect on hosts within infestation areas in the State of California. Established as an introduced pest of deciduous fruits at Chico, California, in 1934, subsequent surveys have revealed nine infestations involving 48,946 host trees, all in California. Regarded as a serious economic threat to fruit-growing areas of the United States, a program of eradication, initiated in 1941, has now advanced to a point where treatment of seven of nine localized infestations has been accomplished, and with survey keeping well ahead of control measures, there is every indication that the program is approaching a concluding phase of operation.

The restriction of this pest to nine localized infestations in the State of California has made it possible to treat infested and exposed host plants, thus reducing a threat of infestation to over 401,672 acres of economic orchard plantings in the State of California. Estimated value of the 1956 crop from this acreage has been placed at \$187,620,000.00.

Program Justification Statement

Hall Scale has been described as an insect species of economic importance, attacking a majority of deciduous fruits of the genus *prunus* and *amygdalus*. It is known to retard vegetative growth and curtail production through serious malformation of fruit.

The scale is thus regarded as an economic threat to the vast deciduous fruit-growing areas of the United States and, because of its limited distribution to a confined area in California, a program of eradication was devised in 1941. Control measures developed on the job have proved highly satisfactory and, if continued, should accomplish the desired result.

Program Objective

The principal objective of the Hall Scale program is to locate the presence of the scale insect and to eliminate the last living scale on host plants in established infestations in the United States. In order that this objective be attained, a program of continuous survey of host acreage in the immediate vicinity of established infestations is being conducted and,

in addition, all host plantings which may have been subject to infestation through movement of infested plant material originating on infested properties are under examination. A program of spraying and fumigation, or removal of hosts within prescribed treatment areas, has been designed to eradicate any infestation as disclosed by survey. Follow-up surveys of treated plantings are being made on a seasonal basis for three years subsequent to the last fumigation.

Status of Infestation

Since the inception of an organized program of eradication in 1941, nine infestations have been discovered, all in California. Seven of these infestations are in Butte County, and two are located in the Yolo County area, 100 miles to the south. All infestations are represented by a total complement of 48,946 host trees and shrubs on which a prescribed program of treatment involving spraying, removal, and fumigation has been concluded. on 47,097 hosts. Removals have accounted for 17,696 of the total. Seven infestations have thus far been eliminated from further treatment, and there are 1,849 hosts on two infestations on which final treatment is anticipated by the winter of 1957.

PROGRAM HISTORICAL INFORMATION

The first recorded infestation of Hall Scale in the Western Hemisphere was first noted in the United States in 1934, at which time it was discovered infesting experimental deciduous fruit trees in orchard plantings of the United States Plant Introduction Garden at Chico, Butte County, California. Circumstantial evidence indicated a possible introduction on apricots and peaches brought into the United States from Chinese and Russian Turkestan in 1911 and 1912. The Bureau of Entomology and Plant Quarantine of the California Department of Agriculture attempted to eradicate the scale from the United States Plant Introduction Garden, but without success. In 1940, survey revealed a large commercial orchard adjacent to the garden to be infested, and the plant garden was found to be reinfested. As a result, a joint federal-state project was organized in 1941. Preliminary investigations revealed that the scale was localized in California and did not occur in any other state. Due to the distribution of the scale being limited to a small area, eradication of this pest was considered practicable. Insecticidal tests indicated that a program of oil spraying, followed by hydrocyanic acid gas fumigation and host removal was sufficient to insure adequate mortality, and the program has since evolved into a full scale eradication effort directed toward eventual elimination of Hall Scale from existing infestations in the California area of scale establishment.

PROGRAM ACTIVITY DURING FISCAL YEAR

Planning and Direction

Program planning of Hall Scale eradication is a cooperative function of the Plant Pest Control Division of the United States Department of Agriculture and the Bureau of Entomology, California Department of Agriculture. This coordinated planning of the program is directed by district inspectors under the supervision of the Northern California Plant Pest Control Division Coordinator. The current policy of organization has been concurred in by the state and federal agencies, and the applied methods of operation have approached a stage where there is no recommendation for change at this time.

Current needs for survey are being met and inspection is keeping abreast of infestation treatment. Concluding phases of fumigation on known infestations are in the offing, and post treatment inspection is continuing in areas already completed. This follow-up inspection and local delimitation of infestation areas should not be relaxed until the program of treatment has been completed.

Survey

Objective

The objective of current inspection endeavor has been to delimit those infestations known to exist in the Butte and Yolo County areas in California, to check host plants shipped from infested areas to California counties remote from centers of infestation, and to appraise the results of fumigation by inspecting host plants which had received final treatment. Throughout the fiscal period ending June 30, 1957, a total of 61,911 hosts was inspected on 5,095 properties.

Technique

The technique of inspecting for Hall Scale consists of visual examination of twigs, bark, leaves, and fruit, both in tree inspection in field plantings and by collection samples in the laboratory.

Field inspections in orchard and dooryard plantings are conducted as intensive individual unit examinations. The bark recesses are thoroughly probed and current growth nodes

and fruiting spurs carefully checked. Tall trees are examined with ladders when necessary.

The minute size of the scale sometimes makes it necessary to examine suspicious material more closely. In this respect, collections of twigs and bark samples are taken at random from host trees and examined under a binocular microscope in the laboratory. Several infested hosts have been located by this method.

Recommendations

As previously stated, the need for a continuation of inspection is commensurate with the completion of treatment. It is anticipated that follow-up inspections on treated properties and adjacent plantings will be made for a period of two years subsequent to the final fumigation, checking results of that treatment.

Eradication

Objective

The end result of survey in the Hall Scale program is treatment of infestation. The treatment phase of the work consists of a program of spraying, fumigation, and removal of individual host trees and shrubs within an established radius of infested plantings. The adopted program of treatment may be described as follows:

Spraying - Two oil sprays (2% light medium emulsive oil, 70V-90UR) are applied during the time of crawler emergence in spring and fall on properties within a treatment area boundary on which an initial fumigation treatment had not been applied.

Fumigation - Three consecutive annual fumigations subsequent to the last finding of live Hall Scale on all infested and buffer properties within a prescribed boundary. Fumigation to be effected during a period of host dormancy (October - January) using a 35-40 cubic centimeter scheduled dosage of hydrocyanic acid gas under gastight tarpaulins exposed at 50 minutes.

Host Removal - Removal of heavy growth along creek banks and non-cultivated areas within infestations to reveal and permit removal and destruction of volunteer host seedlings. Removal of as many hosts as possible from properties under treatment through permission granted by the property owners.

Techniques

The aforementioned program of treatment has been adapted to techniques which were developed on the job subsequent to many tests of insecticides and methods and time of application. Due to the penetration of the scale into deep bark recesses of the host, normal spray applications have not proven effective except as a method of control. To effect a complete mortality it became necessary to use a fumigant. Tests conducted with high dosages of liquid hydrocyanic acid indicated a satisfactory kill of all insects. Operational techniques involve the covering of individual trees with large vinyl-coated nylon tarpaulins ranging in size from 20-foot squares to 85-foot octagonal sheets. Small trees are covered by hand through the use of bamboo poles up to 27 feet in length. Larger trees are covered by use of power driven steel poles 50 feet long and mounted on motorized trucks. Introduction of gas is by a mobile fan-type cold gas applicator. Subsequent to an exposure period of 50 minutes, the residual gas is removed by means of suction, utilizing a power-driven blower. The techniques of actual operation are checked throughout each season by the sampling of gas from within selected fumigation tarpaulins, and concentrations are obtained through titration. Thus, a desired average concentration of six milligrams per liter is maintained.

Accomplishments

Treatment operations for the current fiscal period consisted of one spray application on one infestation, and fumigation of three remaining infestations. Host removals were commensurate with other treatment operations within the infestations involved.

Spraying

One spray application was made on 590 dooryard trees in an eight city-block area in the City of Davis infestation, Yolo County, which was

found on June 15, 1956. A total of 1,800 gallons of a two percent light medium emulsive oil spray was applied at the rate of 3.05 gallons per tree in 56 manhours.

Fumigation

Fumigation operations for the fiscal year 1957 were confined to regular seasonal treatments on two infestations at Chico, Butte County, and on one infestation at Davis, Yolo County. The annual season of treatment was opened on October 1, and officially concluded on November 8, 1956. A total of 2,657 hosts was fumigated with 2,018.9 pounds of hydrocyanic acid during an operating period of 31 days. Field organization included two crews of ten men each, operating with hand-pole units in dooryard plantings of the Chico and Davis infestations, and one crew of ten men, using mobile power-driven fumigation booms, on larger orchard trees in the Chico infestations. All fumigation activity was under the direct supervision of Hall Scale permanent personnel supported by the employment of 25 state seasonal men. The technical phases of the operation followed the prescribed pattern of previous fumigations. Introduction of gas was by a portable cold gas-type applicator. Dosages of 35 cubic centimeters per 100 cubic feet of measurement were evacuated by mobile power-driven blowers subsequent to exposures of 50 minutes.

Fumigation in the Chico, Butte County, area included a third and final treatment on 476 trees in the Bidwell Park infestation, and a second annual treatment on 1,517 hosts in the Chico City infestation. In Davis, Yolo County, a double treatment was applied to 332 hosts. The following table represents a summary of fumigation operations for the period July 1, 1956 to June 30, 1957.

Treatment Area	1956 Date	No. Prop.	No. Trees	No. Units	Lbs. HCN	Avg. Units	Avg. Lbs. HCN
<u>Chico</u>							
Bidwell Park	10/4-19	32	476	7,956	428.4	16.7	.90
City of Chico (71 blocks)	10/1-27	356	1,517	23,904	1,287.1	15.75	.84
<u>Davis</u>							
City of Davis (15 blocks)							
Fumigation #1	10/15-24	119	332	2,826	152.2	8.5	.46
Fumigation #2	11/1-8	119	332	2,809	151.2	8.4	.46
Totals	10/1-11/8	626	2,657	37,495	2,018.9	14.1	.76

Host Removal

Removal of hosts from properties within infestation continued to supplement fumigation operations. In this respect, a total of 3,023 hosts was removed from 507 properties in three infestations under treatment. Included in the total were 658 trees of considerable size and 2,365 volunteer seedling hosts which were scouted in fence rows and slough areas in proximity to existing infestations.

Changes Recommended

As there are only 1,849 hosts on two infestations remaining to complete final fumigations in the planned program of eradication, any change in operational procedure at this time should not be considered. If no new infestations are revealed by survey, the program of treatment will be completed by the winter of 1957.

Other

Cooperation

The Hall Scale Eradication Program is conducted in cooperation with the California Department of Agriculture, Bureau of Entomology. This agency, directly and through the

Agricultural Commissioners of Butte and Yolo Counties, has established eradication areas and necessary quarantine regulations restricting the movement of Hall Scale host material in regulated areas. In addition, the Department has contributed funds, equipment, and personnel for direct operational phases of the action program.

Funds

Federal expenditures were somewhat curtailed as compared to last year's expenses, due to additional funds contributed by the State of California earmarked for control phases of the work. The current trend has been toward the furnishing of a majority of seasonal men by the California Department of Agriculture. During the 1957 fiscal year, federal manpower has been restricted to supervising the survey and treatment phases of the program. The state is also currently supplying five men for inspection work, replacing those regular federal employees who have been transferred to other Division programs within the Region.

Recommendations Fiscal Year 1958

The status of treatment in the various infestation areas has now progressed to a point where completion of all known existing infestations will be accomplished by the winter of 1957. In the intervening period, the inspection routine, involving the repeated delimitation of all areas, should be continued. Post fumigation inspection, which is a continuing phase of seasonal survey, should also be continued until such time as all fumigated properties have received at least three annual post treatment checks. The program for the fiscal year 1958 will follow this plan of operation with emphasis being placed on post fumigation inspection, on properties dropped from treatment, and on another season of fumigation to be carried on during October 1957.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

CONTROL OPERATIONS SUMMARY - FUMIGATION - HOST REMOVAL
HALL SCALE

Region Western

1941 to June 30, 1957

Fiscal Year 1957

Treatment Area	Hosts on Infested Properties	Additional Hosts within Treatment Area	Total Hosts	Stage of Eradication				Treatment Completed	Remaining to be Treated
				Hosts Removed	1st Fum.	2nd Fum.	3rd Fum.		
Chico									
U.S. Plant Introduction Garden	15,000		15,000				15,000	15,000	
Bidwell Park	5,407	8,155	13,562	5,951		**2,349	5,262	13,562	
Johnson	3,600		3,600				3,600	3,600	
Rath	500		500				500	500	
Stilson Canyon	864	62	926	548			378	926	
City of Chico	6	5,173	5,179	3,662		1,286	*231	3,662	1,517
Oroville	629	5,298	5,927	3,990			1,937	5,927	
Davis									
Univ. of Calif.	2,800		2,800	2,800				2,800	
City of Davis #1	30	561	591	216			375	591	
City of Davis #2	75	786	861	529		332		529	332
Totals	28,911	20,035	48,946	17,696		**3,967	27,283	47,097	1,849

*Emergency fumigation applied prior to a regular routine of area treatment - hosts scheduled for one more fumigation

**Trees excluded from further treatment after 2nd fumigation due to location on fringe of treatment area.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division
INSPECTION OPERATIONS SUMMARY
HALL SCALE

Region Western

Fiscal Year 1957

Area	City Blocks	No. Properties	Hosts Inspected	Hosts Infested
<u>Infestation Area</u>				
Chico City	284	2,288	14,415	0
City Area		50	14,449	0
Rural Area (field)			15	0
Rural Area (microscopic)			1,069	0
Rath Area		5	1,540	0
Bidwell Park		2	545	0
Stilson Canyon		4	628	0
Johnson Area		13	3,742	0
Oroville City	71	739	4,874	0
Davis City	88	1,061	8,713	0
Univ. of Calif (Davis Campus)		2		0
<u>Post Fumigation</u>				
Bidwell Park		33	3,143	0
Chico City	9	46	146	0
Stilson Canyon		2	383	0
Oroville City	11	75	330	0
Davis City #1		14	79	0
Davis Host Recipient				0
5 Counties 6 Communities		7	3,943	
<u>Community Inspection (Butte Co.)</u>				
Durham	10	58	319	0
Gridley	125	513	2,464	0
Biggs	82	183	1,114	0
Totals	680	5,095	61,911	0
Cumulative totals since beginning of program	4,297	38,428	924,908	2,960*

*Represents actual infested hosts.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division
EXPENDITURES BY SOURCE AND BY ACTIVITY
HALL SCALE

Fiscal Year 1957

Region Western

	1	2	3	4	5	6	7	8
Source of Cash & Equivalent*	Planning & Direction	Technical Assistance	Survey	Control	Regulatory	Methods Improvement	Other	Total
Plant Pest Control Division	18,242		25,539	29,189				72,970
Other Organizations (Name)								
Calif. Dept. of Agriculture	918		2,398	19,621				22,937
Subtotal - Other Organizations	918		2,398	19,621				22,937
Total (of PPC & Other)	19,160		27,937	48,810				95,907
Contributed Services**								
Calif. Dept. of Agriculture	2,100							2,100
Butte Co. Dept. of Agriculture					250			250
Yolo Co. Dept. of Agriculture					250			250
Total	2,100				500			2,600
Grand Total	21,260		27,937	48,810	500			98,507

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

COOPERATIVE AID RECEIVED
HALL SCALE

Fiscal Year 1957

Region Western

State and Source of Aid														1	2	3	4	5	6	7	8	
Cash and Equivalent Aid*														Cash		Personal Services	Equipment & Supplies	Space	Total of Cash & Equiv.	Intangible Service Estimate**	Source Grand Total	Remarks
California Dept. of Agriculture Bureau of Entomology															17,805	3,428		1,704	22,937	2,100	25,037	
Yolo County Dept. of Agriculture																				250	250	
Butte County Dept. of Agriculture																				250	250	
Total This Period															17,805	3,428		1,704	22,937	2,600	25,537	

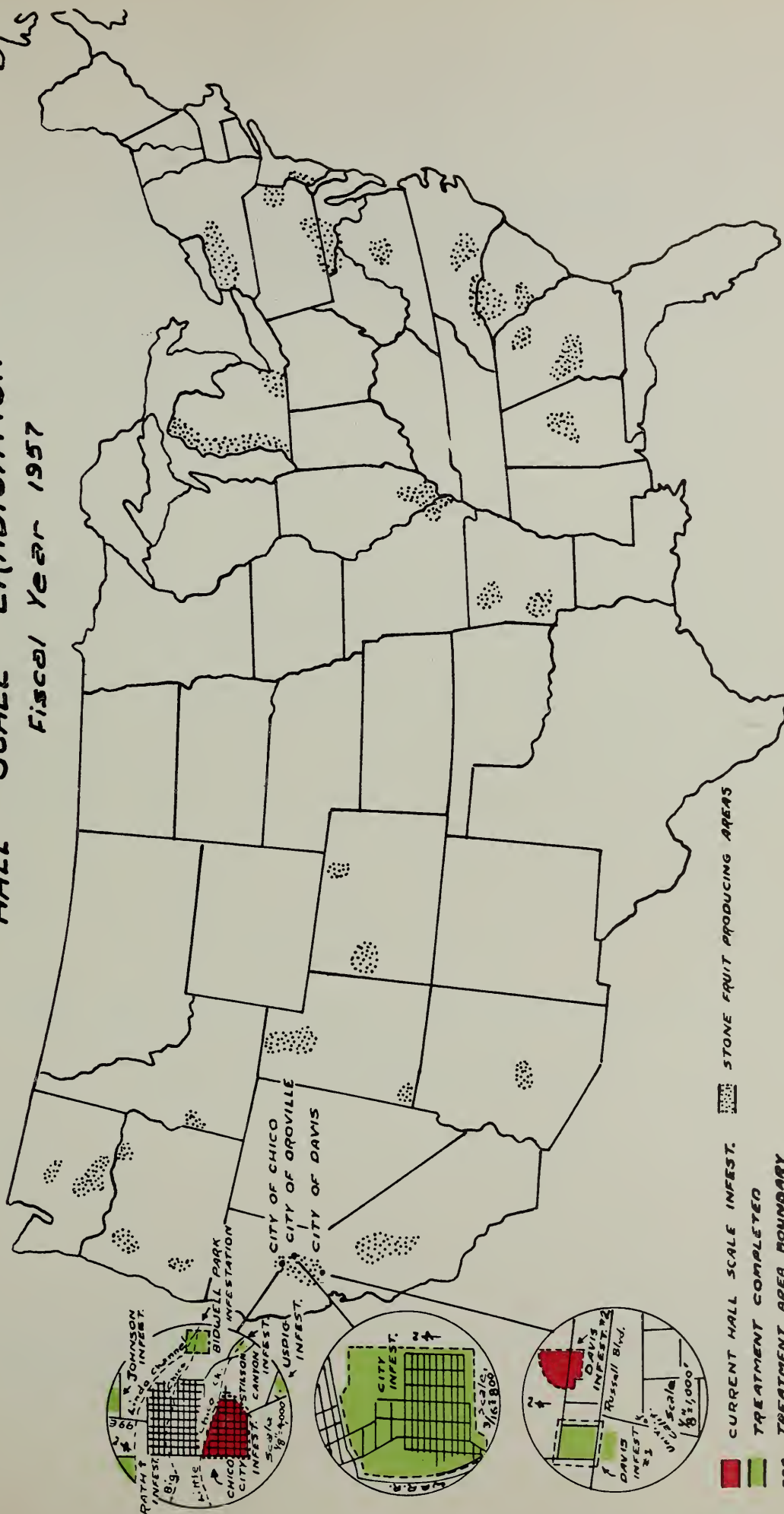
* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.



HALL SCALE ERADICATION

Fiscal Year 1957



STONE FRUIT PRODUCING AREAS

CURRENT HALL SCALE INFECTION

TREATMENT COMPLETED

TREATMENT AREA BOUNDARY



★

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
CENTRAL REGION

ANNUAL PROGRAM REPORT
JAPANESE BEETLE CONTROL
July 1, 1956 - June 30, 1957

Cooperating Agencies:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
In Cooperation with
State, County, and Local Agencies

October 21, 1957
Minneapolis, Minn.

R. O. Bulger
Regional Supervisor

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I. INTRODUCTORY

A. Statement of Problem

Two general types of Japanese beetle infestation exist within the Central Plant Pest Control Region. The regulated area in eastern Ohio has a general infestation varying in intensity and is beyond present resources to control. In western Ohio, Michigan, Indiana, Kentucky, and Illinois isolated infestations have become established. Control programs in these areas can be effective in preventing a serious hazard of further spread. Beetles have been trapped in Milwaukee, Wisconsin, and St. Louis, Missouri, but have not become established. Another situation, slightly different, involves the isolated agricultural infestation in the Sheldon-Kentland vicinity on the Illinois-Indiana state line. Rather than damage ornamentals, the Japanese beetles in this area attack soybeans, silks of corn, and their favorite weed host plants.

B. Program Justification Statement

The Japanese beetle is a voracious feeder, attacking more than 275 different plants. In the Sheldon-Kentland area it has demonstrated its ability to damage field crops, particularly soybeans and corn. It not only can cause widespread damage to ornamentals and turf, but it might also become a factor in limiting soybean production in the principal soybean-producing areas of the United States.

C. Program Objective

The objective of the cooperative Japanese beetle control program is to retard the spread of this pest from established infested areas. Surveys are conducted every year to locate new infestations and evaluate known infestations. Isolated infestations are controlled to hold population levels down, thus reducing the migratory tendency of the pest seeking new food supplies, and, further, cutting down the incidence of so-called "hitchhiking." Within the generally infested or regulated areas, State and Federal quarantine regulations governing commodities capable of transporting the Japanese beetle are enforced.

During this reporting period, 29,000 traps were set to detect new infestations and evaluate existing infestations. Cooperative control programs involving 2,840 acres at Sheldon, Illinois, and 5,850 acres at Bellevue, Ohio, were completed to reduce these isolated infestations to a low level and prevent additional spread. Indiana treated several small areas. For a complete list of accomplishments, see table 1.

D. Changes in Work Plan

The original recommendation for soil-treating included East St. Louis. Funds for soil-treating were limited; consequently we had

to make a choice of eligible areas. After a series of conferences with the State cooperators, it was agreed that the East St. Louis area could be postponed.

E. Status of Infestation

Adult emergence was first reported on June 15, in Ohio. Reports of emergence in East St. Louis, Illinois; South Bend, Indiana; and St. Louis, Missouri, followed within the next 15 days. Indications were that population intensities would be higher than for several years. As of June 30, results from traps which had been placed or were being placed during this period verified this. No new infestations had been located at the close of this reporting period.

II. PROGRAM HISTORICAL INFORMATION

The Japanese beetle control program is primarily regulatory. It was activated three years after the Japanese beetle was discovered in central New Jersey in 1916 by Dr. Harry B. Weiss. The beetle was probably brought to this country with plants from Japan before the Plant Pest Act of 1912. It was soon recognized as a destructive pest to home owners and farmers. In 1918 New Jersey and the U. S. Department of Agriculture made an attempt to eradicate the pest. The original Federal quarantine went into effect governing the movement of sweet corn from a small area in New Jersey in 1919. Other commodities were subsequently added. As an indication that the quarantine action has retarded the spread of this pest, to date only 5 percent of the United States area is under regulation. This includes all or portions of the District of Columbia, and the following states: Connecticut, Delaware, Maryland, Massachusetts, New Jersey, Pennsylvania, Rhode Island, Maine, New Hampshire, New York, North Carolina, Ohio, Vermont, Virginia, and West Virginia. At the present time shipments of soil and plants to non-regulated destinations are controlled the year round, and during the summer movement of fruits and vegetables, airplanes, refrigerator cars, and trucks are subject to quarantine regulations.

Early efforts at control were costly and often not too successful. Modern insecticides are very effective and offer a chance to further retard the spread of the Japanese beetle to the remainder of the United States.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

Following the completion of the trapping program and visual scouting, the current status of the pest is determined in the infested states in the Region. Recommendations are prepared for discussion with the State regulatory officials. This is a cooperative program and joint discussion results in a program for the next season. The program is outlined in a work plan which designates the function of

each of the cooperators. This plan is put into operation and followed. Any change is made only after joint agreement is reached by the co-operators.

B. Technical Assistance

Experiment Stations in the infested states have active projects concerning the Japanese beetle in Ohio, Indiana, and Illinois. They are studying many aspects, including ecology, control, damage, and population trends. They have been cooperative in discussing their results and keeping us informed, particularly regarding the locations of new infestations.

The State Departments of Agriculture and, in Indiana, the Department of Conservation have provided manpower, money, and equipment in controlling isolated infestations outside of the regulated area. They have borne a large share of the manpower load in the trapping program in several of the states. State officials also have given technical assistance to golf associations, parks, and individuals in their control efforts.

Division personnel have had to use most of their time in the regulatory aspects of the program. They do, however, as time permits, train cooperative help. They are often called on to supervise the treatment of private properties such as golf courses and, on occasion, appear before garden clubs to advise them on Japanese beetle control.

C. Survey

1. Objective: In the Central Plant Pest Control Region our primary objective outside of the regulated area is to promptly detect new infestations of Japanese beetle. Once a new infestation is located, additional effort is put forth to determine the extent of the infestation. Within the regulated area, visual scouting is used as an aid in nursery certification. Density surveys are also conducted to determine areas where special summer regulations will apply.
2. To accomplish the survey program, specially designed traps using an attractant are placed near host plants at regular intervals throughout the area in question. Our density surveys utilize feeding damage on selected host plants, coupled with visual observations for the adult, to determine population densities.

D. Eradication or Control

The Japanese beetle in the Central Region can be eradicated in some situations and kept under control in others. Small isolated infestations away from the generally infested areas are suitable for an eradication program. Other areas may be impractical because of the character of the infestation, proximity to a large general infestation,

or circumstances that would not permit eradication procedures. When this occurs, our only recourse is to keep the infestation under control, preventing high populations by using adulticides or soil treatment in selected areas. The combination of the two approaches outlined above was practiced this past year.

Within the regulated area, eradication or control has been considered impractical. Under these circumstances, the movement of commodities capable of transporting beetles are regulated according to provisions outlined in Quarantine 48.

Soil treatment consists of a uniform application of a granulated insecticide. Where certification is not being considered, 20 pounds of 10-percent dieldrin has been used for control. This treatment has resulted in near eradication in many instances. Where certification is a requirement, increased dosages are used and maintained at prescribed levels.

When adults become numerous in a locality where hitchhiking becomes a hazard, the foliage is treated by a mist blower using DDT. This treatment is considered as a temporary measure. Little or no effective long-range control is achieved.

E. Regulatory

1. Objective: The Japanese beetle program is designed to retard the spread of the beetles from the regulated area and the isolated infestations that have become established in other localities. State and Federal quarantine regulations are enforced in the regulated area. The isolated infestations are covered by agreement with the states establishing procedures for regulating commodities for movement parallel to the Federal quarantine. In these areas systematic control is carried on to hold beetle populations at a very low level.
2. Procedures: No changes are planned in the established procedures, except in that of handling nursery stock during the flight season under certain conditions. This change allows the movement of nursery stock during the flight season without dipping or injection, if the treated soil in the nursery meets certification requirements.

F. Methods Improvement

No departure from the established procedures, which seemed to be functioning effectively, were made during the year.

G. Recommendations

1. Tests should be encouraged to simplify certification and regulatory procedures.

2. Summer quarantines should be devised to include additional areas.
3. More emphasis should be placed on an informational program concerning summer quarantine requirements designed for wholesale food buyers.
4. State authorities should be encouraged to enforce the screening of motor-truck and trailer vents.
5. The highest priority should be assigned isolated fringe infestations for control.

Table 1. - Japanese Beetle Survey - Fiscal Year 1957

State	Survey Outside Regulated Area			Control Treatments			Certification Services		
	Number	Number	No. Locations Where	Outside Reg. Areas	Number	Total	Est. Value		
	Traps	Locations	Infestations Found	Soil	Foliage	Shippers	Service	of Products	
	in Use	Scouted	Initial	Recurrence:	(Acres):	(Gals.):	Serviced	Calls	: Certified
Illinois	1,590	0	0	0	2,840	58,100	0	0	0
Indiana	1,430	0	0	1	324	10,000	0	0	0
Iowa	518	0	0	0	0	0	0	0	0
Kentucky	1,904	154	0	4	0	0	0	0	0
Michigan	16,386	36	66	0	158	0	0	0	0
Minnesota	100	0	0	0	0	0	0	0	0
Missouri	1,900	9	1	0	0	0	0	0	0
Ohio	4,981	351	0	7	6,180	2,308	279	3,658	\$8,832,410
Wisconsin	179	9	1	0	0	0	0	0	0
Totals	28,988	559	68	12	9,502	70,408	279	3,658	\$8,832,410

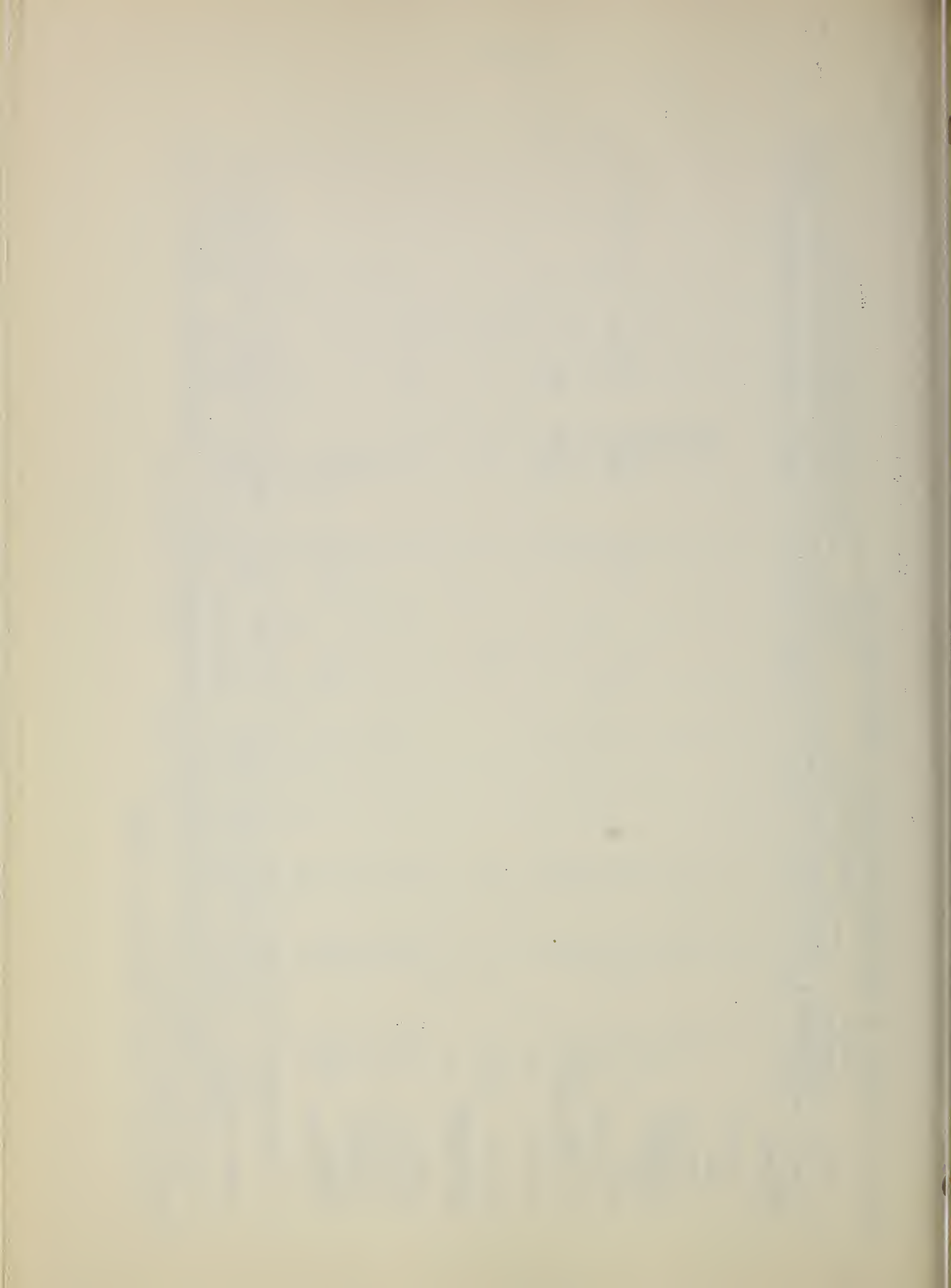
Table 2. - Summary of Associated Activities - Fiscal Year 1957

State	Public : : Meetings : : Attended :	Presentations			Feature : : & News : : Stories :			Extent These Aids Were Used**			Special Reports
		Talks :	Slides :	Films :	Radio :	TV :		Exhibits :	Bulle-:Circu-:Infest.	Maps :	
								tings* : lars*:& Posters :			
<u>FEDERAL</u>											
Illinois	1	1	-	-	-	-	-	-	-	-	-
Iowa	-	-	-	-	-	-	-	100	-	-	-
Kentucky	2	3	-	-	1	-	-	700	-	-	-
Michigan	-	1	-	-	-	-	-	415	-	-	-
Missouri	-	-	-	-	-	-	-	200	-	-	-
Ohio	8	8	15	-	1	-	-	3,500	300***	6	-
Wisconsin	-	-	-	-	-	-	-	-	-	-	2
Subtotals	11	13	19	-	2	-	3	4,915	300	6	2
-	-	-	-	-	-	-	-	-	-	-	-
<u>COOPERATORS</u>											
Indiana	-	-	-	-	-	-	-	-	12	-	-
Kentucky	6	6	-	-	1	-	-	-	-	-	-
Michigan	-	8	1	-	1	-	-	400	-	-	-
Missouri	1	1	-	-	-	-	-	25	-	-	1
Ohio	12	12	-	-	2	1	-	1,500	-	-	-
Wisconsin	-	-	-	-	-	1	-	-	-	-	-
Subtotals	19	47	1	-	4	2	1	1,925	12	-	1
GRAND TOTALS	30	60	20	-	6	2	1	6,840	312	6	3

*Written by Federal personnel for release direct or through cooperators.

**Conservative estimate.

***Shippers' guides; quarantine notices.



Cooperative Aid Received - Fiscal Year 1957

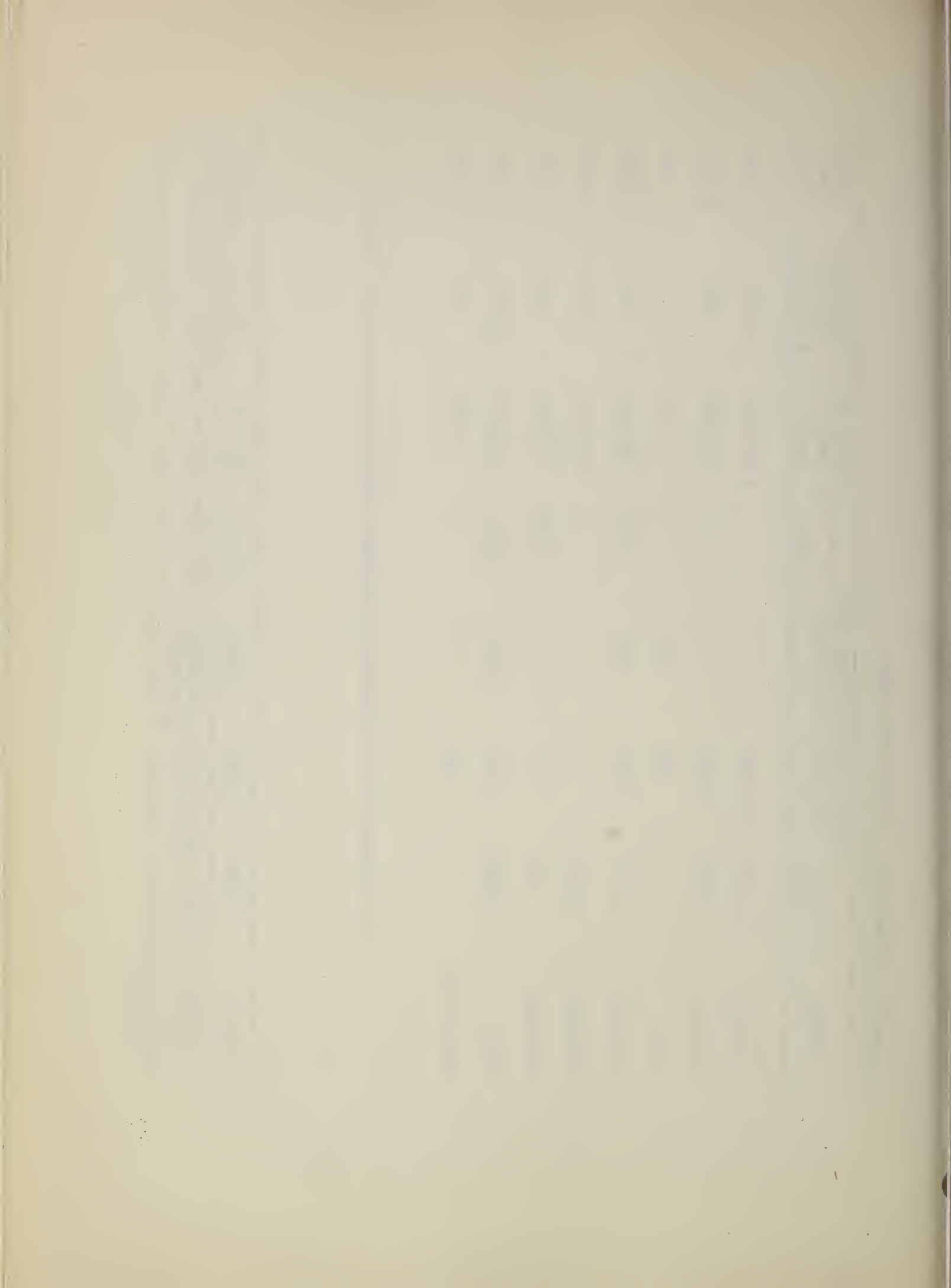
State	Cash and Equivalent Aid*			Total of :			Source	
	Cash	Personal : Equipment :	Services : & Supplies:	Space	Cash & : Equiv.* :	Intangible : Service :	Grand	Total
Illinois	\$14,728	\$11,287	\$ 0	\$ 0	\$ 26,015	\$ 1,554	\$ 27,569	
Indiana	10,000	20,893	0	0	30,893	1,000	31,893	
Iowa	0	350	100	0	450	0	450	
Kentucky	14,500	1,500	250	500	16,750	500	17,250	
Michigan	15,801	0	0	0	15,801	5,000	20,801	
Missouri	900	150	0	200	1,250	400	1,650	
Ohio	30,000	5,000	4,500	1,800	41,300	44,100	85,400	
Wisconsin	0	584	0	0	584	300	884	

(No expenditures in Minnesota, Nebraska, North Dakota, or South Dakota.)

Totals	\$85,929	\$39,764	\$4,850	\$2,500	\$133,043	\$52,854	\$185,897
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*Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

**Limited to services incidental to other activities for which only an estimated value is available.



Expenditures by Source and by Activity - Fiscal Year 1957

State	: Planning & : Technical : Survey : Control : Regulatory : Methods : Other : Total
: Direction : Assistance :	:

CASH & EQUIVALENT*

PPC Division	\$ 8,000	\$ 8,000	\$42,000	\$ 10,300	\$23,000	0	\$ 552	\$ 91,852
Other Organizations:								

Ill.	1,000	0	0	24,715	300	0	0	26,015
Ind.	3,000	1,000	8,170	18,723	0	0	0	30,893
Iowa	100	100	250	0	0	0	0	450
Ky.	1,000	0	2,000	13,250	0	0	500	16,750
Mich.	2,500	0	8,000	4,971	0	0	330	15,801
Mo.	150	0	900	0	0	0	200	1,250
Ohio	2,000	500	3,000	30,000	4,400	0	1,400	41,300
Wis.	0	0	584	0	0	0	0	584
Subtotals	\$9,750	\$1,600	\$22,904	\$ 91,659	\$ 4,700	0	\$2,430	\$133,043

CONTRIBUTED SERVICES**

Ill.	0	1,500	0	54	0	0	0	1,554
Ind.	0	1,000	0	0	0	0	0	1,000
Iowa	0	0	0	0	0	0	0	0
Ky.	0	500	0	0	0	0	0	500
Mich.	0	0	0	5,000	0	0	0	5,000
Mo.	0	100	300	0	0	0	0	400
Ohio	0	4,500	1,000	30,900	0	6,500	1,200	44,100
Wis.	100	100	100	0	0	0	0	300
Subtotals	100	7,700	1,400	35,954	0	6,500	1,200	52,854
GRAND TOTALS	\$17,850	\$17,300	\$66,304	\$137,913	\$27,700	\$6,500	\$4,182	\$277,749

*Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

**Limited to services incidental to other activities for which only an estimated value is available.

Revised

(* - - *)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
EASTERN REGION

ANNUAL PROGRAM REPORT

JAPANESE BLEETLE

July 1, 1956 - June 30, 1957

COOPERATING AGENCIES:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
and
State Departments of Agriculture

December 1957
Moorestown, New Jersey

H. L. Smith
Regional Supervisor



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Table - Summary of Regional Field Activity

I. INTRODUCTORY

A. Statement of Problem

The beetle attacks more than 200 agricultural and ornamental plants, causing damage of around 10 million dollars annually. In the summer the adult beetle, which lives about 30 days, feeds on foliage and fruit of peaches, apples, and small fruits; also on corn, soybeans, ornamentals and other plants. The root feeding grub is responsible for extensive damage to turf in pastures, lawns, golf courses and other grassed areas. When once established, control of the Japanese beetle by insecticides or biological controls is a slow, difficult and costly process.

B. Program Justification Statement

The operation of Federal-State regulatory controls, with associated research and cooperation of regulated industries provides a practical and successful method of controlling the pest.

C. Program Objective

To give uninfested states protection from infestation carried from regulated areas in hosts and infestible articles and carriers; also to assist in dissemination surveys and eradication or control at isolated infestations. This is accomplished by reasonable quarantine compliance methods, effective detection methods and use of most efficient and economical insecticides and applicators - all with suitable related informational service to the public.

D. Status of Infestation

The beetle occurs in varying numbers in all or parts of all states in this Region. Generally, infestations are lighter than formerly, but spot areas of heavy infestation are scattered through the states and the District of Columbia.

II. PROGRAM HISTORICAL INFORMATION

In force since 1919, the cooperative quarantine and control program has provided safe, effective and economical methods of compliance, with a minimum of interference to regulated industry, commerce and the public. Special traps, baited with aromatics, have been developed and used in country-wide dissemination surveys, and recently some of the newer residual insecticides, especially in granular formulation applied by modern air and ground applicators, and DDT foliage sprays have made eradication possible at incipient infestations outside of regulated areas.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

The cooperative program is under Federal direction to insure stable regulations, uniform methods of compliance, with experienced supervision. The year round regulations apply to soil and plants and the growers involved range from backyard gardeners to wholesale establishments. Because of the complexities involved and the necessity for voluntary compliance, regulated industries are included in planning with state and federal regulatory and research representatives. The same applies to the shippers and carriers affected by seasonal regulations when and where there is danger of adult spread. Area supervisors work with Regional Staff on planning.

Area supervisors are responsible for general field supervision and direct supervision is by District leaders. All participate in appraisal and reporting.

B. Technical Assistance

Over the years there has been excellent operational research with entomologists, chemists and other scientists in Entomological Research Division, cooperating states and industry. These efforts have resulted in the development of safe, effective methods of quarantine compliance, special traps for detection, and practical eradication suppression treatments at isolated infestations with modern insecticides and applicators. This close association with research and industry in operational developmental work is essential to the effective operation of the program, and it is expected to continue.

C. D. Survey, Eradication-Control

Surveys were made in the nonregulated parts of Maine, New Hampshire, Vermont, New York, Virginia, and West Virginia. Beetles have existed in scattered localities in these areas. Soil and foliage treatments have suppressed or eradicated some infestations. Further observations are necessary in other places to determine regulatory and control needs. Other infestations have developed to the point where extension of regulated area is warranted, and Virginia and West Virginia State regulated areas were extended in Spring of 1957. Extension of federal regulated area will follow later. Annual surveys in the nonregulated sections of partially regulated quarantined states include the premises and environs of plant growing establishments.

E. Regulatory

In this Region, most of the activities are related to the year round certification services to regulated plant shippers. There is also seasonal regulatory work related to the certification of fresh fruits and vegetables and regulatory control of refrigerator cars and trucks, also airplanes. Regulated industry has a choice of a number of safe, effective, low cost methods of quarantine compliance. These have been developed in continuing cooperative operational research. States furnished part of the inspection force, also space, transportation and other facilities.

Table I summarizes the Region's inspection and certification activities.

For several years, special attention has been given to the problem of adapting seasonal regulatory requirements to beetle abundance in each specific locality. Previously, requirements had been based on continuous infestations of high intensity. Such requirements are no longer applicable. Now consideration is being given to quarantine changes which would permit the inspector to take action wherever and whenever he determines the need to eliminate a hazard. As an initial step, the 1957 seasonal requirements will : (1) Specify a considerably smaller regulated area. (2) Dates of termination will be on the basis of local conditions, rather than designated at beginning of the season. (3) Inspectors will be authorized to require certification or regulatory action for any fresh fruit or vegetable or vehicle at any time or place he determines a hazard exists. Also, there will be an attempt to secure more destination checks by state and Division inspectors in nonregulated areas.

F. Methods Improvement

All Regional employees are instructed to be alert for operational improvements of all kinds, and to submit related ideas at any time. Important changes in operational procedures are discussed beforehand with field personnel. Cooperative federal-state-industry cooperative research is a continuing and essential program. Regulatory reports were consolidated to a single sheet. There was a considerable increase in use of rubber stamp certificates and a new combination paper certificate designed for use with shipments under from 1 to 4 quarantines was authorized. A revised treating manual is being prepared.



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

Region EASTERN

JAPANESE BEETLE

FISCAL YEAR 1957

SUMMARY OF REGIONAL FIELD ACTIVITY

State and County	Survey Outside Regulated Area			Control Treatments		Certification Services			
	Number Traps in Use	Number Locations Scouted	Number Locations Where Infestations Were Found		Outside Reg. Areas Soil (Acres)	Foliage (Gals.)	Number Shippers Serviced	Total Service Calls	Est. Value Products Certified
			Initial	Recurrence					
Connecticut	270	13	-	2	-	-	-	590	1,310,325
Delaware								561	230,893
Maine								317	69,651
Maryland	418	114		4				2702	1,439,059
Massachusetts								1415	405,437
New Hampshire								221	57,243
New Jersey	197	20	5	3	19	665		3447	1,932,784
New York								2491	1,340,172
Pennsylvania								2719	1,868,100
Rhode Island	450	671	24	74				401	282,230
Vermont								157	13,742
Virginia)								1234	867,343
West Virginia)	1335	818	29	83	19	665	*	68	148,130
Dist. Columbia								1	3,560
Total								16,324	9,969,669

* up to 800 commercial shippers and several hundred private individuals received quarantine services.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

SOUTHERN REGION

ANNUAL PROGRAM REPORT

JAPANESE BEETLE

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Regulatory, Control, Research, and Extension Agencies of
the Affected States

Gulfport, Mississippi

C. C. Fancher
Regional Supervisor

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I. INTRODUCTORY

A. Statement of Problem

The aims of Japanese beetle control remain fairly constant from year to year. The problem, however, becomes more involved as new finds are located. As a result of trapping and survey activities, initial infestations were found in the states listed below. In these same states, recurrences also were reported.

<u>State</u>	<u>No. of Locations Where Infestations Were Found</u>	
	<u>Initial</u>	<u>Recurrent</u>
Georgia	3	13
North Carolina	4	12
South Carolina	1	3
Tennessee	<u>2</u>	<u>1</u>
Total	10	29

Damage from this insect was restricted to ornamentals and yard plants in infested residential and semiwooded areas of the Region. The states in the Southern Region known to be infested with Japanese beetle include Georgia, North Carolina, South Carolina, and Tennessee. The known infestations in South Carolina and Tennessee are few, and the intensity is considered very light.

B. Program Justification Statement

Preventing further spread of the Japanese beetle in the Southern Region cannot be overemphasized. The adult beetle feeds on more than 200 different agricultural plants, shrubs, and trees; and in the grub stage, the insect feeds in the ground on the roots of grasses and other plants, often ruining pastures, lawns, golf courses, and other turf areas. This insect, because of its potential destructiveness, is a threat to agriculture in all noninfested areas of the United States. The damage caused by this insect throughout the United States in 1955 was estimated at \$10,000,000.

C. Program Objective

The long-term objective is to eradicate the Japanese beetle from the Southern Region. To accomplish this goal, Division and State personnel, during fiscal year 1957, conducted surveys to locate new infestations and determine population densities at presently known infested areas; applied suitable insecticides where practicable; and enforced existing quarantines by checking at shipping and produce-handling points all agricultural materials which might have been contaminated or infested with this insect.

2. 1990. 1991. 1992. 1993. 1994. 1995. 1996. 1997. 1998. 1999. 2000. 2001. 2002. 2003. 2004. 2005. 2006. 2007. 2008. 2009. 2010. 2011. 2012. 2013. 2014. 2015. 2016. 2017. 2018. 2019. 2020. 2021. 2022. 2023. 2024. 2025. 2026. 2027. 2028. 2029. 2030. 2031. 2032. 2033. 2034. 2035. 2036. 2037. 2038. 2039. 2040. 2041. 2042. 2043. 2044. 2045. 2046. 2047. 2048. 2049. 2050. 2051. 2052. 2053. 2054. 2055. 2056. 2057. 2058. 2059. 2060. 2061. 2062. 2063. 2064. 2065. 2066. 2067. 2068. 2069. 2070. 2071. 2072. 2073. 2074. 2075. 2076. 2077. 2078. 2079. 2080. 2081. 2082. 2083. 2084. 2085. 2086. 2087. 2088. 2089. 2090. 2091. 2092. 2093. 2094. 2095. 2096. 2097. 2098. 2099. 2100. 2101. 2102. 2103. 2104. 2105. 2106. 2107. 2108. 2109. 2110. 2111. 2112. 2113. 2114. 2115. 2116. 2117. 2118. 2119. 2120. 2121. 2122. 2123. 2124. 2125. 2126. 2127. 2128. 2129. 2130. 2131. 2132. 2133. 2134. 2135. 2136. 2137. 2138. 2139. 2140. 2141. 2142. 2143. 2144. 2145. 2146. 2147. 2148. 2149. 2150. 2151. 2152. 2153. 2154. 2155. 2156. 2157. 2158. 2159. 2160. 2161. 2162. 2163. 2164. 2165. 2166. 2167. 2168. 2169. 2170. 2171. 2172. 2173. 2174. 2175. 2176. 2177. 2178. 2179. 2180. 2181. 2182. 2183. 2184. 2185. 2186. 2187. 2188. 2189. 2190. 2191. 2192. 2193. 2194. 2195. 2196. 2197. 2198. 2199. 2200. 2201. 2202. 2203. 2204. 2205. 2206. 2207. 2208. 2209. 2210. 2211. 2212. 2213. 2214. 2215. 2216. 2217. 2218. 2219. 2220. 2221. 2222. 2223. 2224. 2225. 2226. 2227. 2228. 2229. 2230. 2231. 2232. 2233. 2234. 2235. 2236. 2237. 2238. 2239. 2240. 2241. 2242. 2243. 2244. 2245. 2246. 2247. 2248. 2249. 2250. 2251. 2252. 2253. 2254. 2255. 2256. 2257. 2258. 2259. 2260. 2261. 2262. 2263. 2264. 2265. 2266. 2267. 2268. 2269. 2270. 2271. 2272. 2273. 2274. 2275. 2276. 2277. 2278. 2279. 2280. 2281. 2282. 2283. 2284. 2285. 2286. 2287. 2288. 2289. 2290. 2291. 2292. 2293. 2294. 2295. 2296. 2297. 2298. 2299. 2300. 2301. 2302. 2303. 2304. 2305. 2306. 2307. 2308. 2309. 2310. 2311. 2312. 2313. 2314. 2315. 2316. 2317. 2318. 2319. 2320. 2321. 2322. 2323. 2324. 2325. 2326. 2327. 2328. 2329. 2330. 2331. 2332. 2333. 2334. 2335. 2336. 2337. 2338. 2339. 2340. 2341. 2342. 2343. 2344. 2345. 2346. 2347. 2348. 2349. 2350. 2351. 2352. 2353. 2354. 2355. 2356. 2357. 2358. 2359. 2360. 2361. 2362. 2363. 2364. 2365. 2366. 2367. 2368. 2369. 2370. 2371. 2372. 2373. 2374. 2375. 2376. 2377. 2378. 2379. 2380. 2381. 2382. 2383. 2384. 2385. 2386. 2387. 2388. 2389. 2390. 2391. 2392. 2393. 2394. 2395. 2396. 2397. 2398. 2399. 2400. 2401. 2402. 2403. 2404. 2405. 2406. 2407. 2408. 2409. 2410. 2411. 2412. 2413. 2414. 2415. 2416. 2417. 2418. 2419. 2420. 2421. 2422. 2423. 2424. 2425. 2426. 2427. 2428. 2429. 2430. 2431. 2432. 2433. 2434. 2435. 2436. 2437. 2438. 2439. 2440. 2441. 2442. 2443. 2444. 2445. 2446. 2447. 2448. 2449. 2450. 2451. 2452. 2453. 2454. 2455. 2456. 2457. 2458. 2459. 2460. 2461. 2462. 2463. 2464. 2465. 2466. 2467. 2468. 2469. 2470. 2471. 2472. 2473. 2474. 2475. 2476. 2477. 2478. 2479. 2480. 2481. 2482. 2483. 2484. 2485. 2486. 2487. 2488. 2489. 2490. 2491. 2492. 2493. 2494. 2495. 2496. 2497. 2498. 2499. 2500. 2501. 2502. 2503. 2504. 2505. 2506. 2507. 2508. 2509. 2510. 2511. 2512. 2513. 2514. 2515. 2516. 2517. 2518. 2519. 2520. 2521. 2522. 2523. 2524. 2525. 2526. 2527. 2528. 2529. 2530. 2531. 2532. 2533. 2534. 2535. 2536. 2537. 2538. 2539. 2540. 2541. 2542. 2543. 2544. 2545. 2546. 2547. 2548. 2549. 2550. 2551. 2552. 2553. 2554. 2555. 2556. 2557. 2558. 2559. 2560. 2561. 2562. 2563. 2564. 2565. 2566. 2567. 2568. 2569. 2570. 2571. 2572. 2573. 2574. 2575. 2576. 2577. 2578. 2579. 2580. 2581. 2582. 2583. 2584. 2585. 2586. 2587. 2588. 2589. 2590. 2591. 2592. 2593. 2594. 2595. 2596. 2597. 2598. 2599. 2600. 2601. 2602. 2603. 2604. 2605. 2606. 2607. 2608. 2609. 2610. 2611. 2612. 2613. 2614. 2615. 2616. 2617. 2618. 2619. 2620. 2621. 2622. 2623. 2624. 2625. 2626. 2627. 2628. 2629. 2630. 2631. 2632. 2633. 2634. 2635. 2636. 2637. 2638. 2639. 2640. 2641. 2642. 2643. 2644. 2645. 2646. 2647. 2648. 2649. 2650. 2651. 2652. 2653. 2654. 2655. 2656. 2657. 2658. 2659. 2660. 2661. 2662. 2663. 2664. 2665. 2666. 2667. 2668. 2669. 2670. 2671.

D. Changes from Work Plans

The only changes made during this fiscal year from the original work plan were (1) an adjustment in control operations, and (2) expansion of survey activities as the result of initial and recurrent finds in the states of Georgia, North Carolina, South Carolina, and Tennessee. Every effort should be made to determine the location of all infestations in the Region, and appropriate eradication steps should be taken immediately.

E. Status of Infestation

In Lumpkin County, Georgia, the boundaries of known infestations were extended, and the Atlanta airport in Fulton County, Georgia, was found generally infested. In North Carolina, 12 additional counties were placed under state and federal quarantine. Spotty and light infestations were found to exist in some areas of both North Carolina and Tennessee.

II. PROGRAM HISTORICAL INFORMATION

Japanese beetles have been known to exist in parts of northeastern United States since about 1916, and is believed to have been introduced with plants brought from Japan before the Plant Pest Act of 1912. In the Southern Region, infestations are now known to be present on a local of "spotted" basis in the states of Georgia, North Carolina, South Carolina, and Tennessee.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

Programs were developed in cooperation with interested appropriate State agencies. These program activities included (1) conduct of surveys to locate new infestations and to determine population densities in known infested areas, (2) prevention of further spread by regulating the movement of nursery stock, fresh fruits and vegetables, exposed aircraft, trucks and railroad cars, and other means of conveyance which present a hazard of spread, and (3) certification, under proper supervision, of nursery stock and, where feasible, treatment of the soil of the entire block of nursery stock thought to be infested. Where infestations were isolated, eradication programs were encouraged.

Foliage sprays were applied during the adult-flight period in areas where heavy populations existed and where there was a hazard of spread through the movement of regulated articles, vehicles, aircraft, etc.

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In general, the same type program will be conducted during the coming year. Greater emphasis will be placed on the overall treatment of nurseries and the development of eradication programs where practicable. Farmer cooperation in the certification of fresh fruits and vegetables to further prevent the hazard of spread will also be stressed.

B. Technical Assistance

Division and State personnel provided technical assistance for nurserymen, gardeners, and farmers on the treatments required to certify their produce for movement under the Japanese beetle quarantine regulations. The Extension Service of each state under discussion was very active in disseminating information to farmers and others on the control of Japanese beetle grubs in pastures, gardens, and lawns, and on control of adult beetles for fruits, vegetables, and flower gardens. Fumigation of farm produce, nursery stock, and aircraft to prevent Japanese beetle spread, also, was the responsibility of Division and State personnel.

C. Survey

1. Objective

Surveys conducted in the infested states were continued in order to delimit known infested counties and to locate new infestations. Special attention was given nurseries, military installations, airports, trucking centers, and other areas most likely to be exposed to Japanese beetles. Limited trapping was done in adjoining noninfested states, also.

2. Procedures or techniques used

Division and State field personnel conducted Japanese beetle surveys in connection with other regular field work during the active adult beetle season. Traps were used in areas where inspectors were stationed close enough to check them efficiently. Nurseries were scouted, rather than trapped, since the traps have a tendency to draw the beetles to the nurseries from other areas. Outlying areas were scouted by assigning inspectors to the counties where surveys were desired.

3. Accomplishments

As a result of the year's survey work, it was necessary to place 12 additional North Carolina counties under the state and federal Japanese beetle quarantine. Specimens were found at the old infested sites in Atlanta, Austell, Doraville, Marietta, Toccoa, and Dahlonega, Georgia. The boundaries

of the infestation in Lumpkin County, Georgia, were also extended. The Atlanta airport, including a portion of Clayton County, Georgia, was found to carry beetle populations. Surveys revealed that a portion of Gainesville in Hall County, Georgia, also was infested; and initial, light infestations were found in South Carolina and Tennessee.

5. Recommendations for coming year

Similar survey operations will be conducted during fiscal year 1958. In the regulated areas, more emphasis will be placed on the survey of regulated farm products and produce in the growing areas, and farmers will be encouraged to eliminate the Japanese beetle in their fields rather than at the market areas. The surveys of noninfested counties in the generally infested areas will be continued, and spot trapping will be performed in noninfested states.

D. Eradication or Control

1. Objective

In Georgia, at the beginning of the year, the objective was to eradicate the Japanese beetle from all known infested areas. However, due to new finds and extensions of known infestations, "stop of spread" became the immediate goal. Foliage sprays were applied in other regulated areas of the remaining infested states during the adult-flight period. Where a hazard of spread extended as a result of movement of fresh fruits and vegetables, aircraft, and other vehicles, nurserymen were encouraged to apply soil treatments on infested nurseries as certification treatments.

2. Procedures or Techniques Used

The use of DDT foliage spray around markets, truck and rail centers, and airports reduced the adult populations to the point that movement could be allowed without the hazard of spreading the adult Japanese beetle. These treatments, however, have little effect on the next season's populations. Where eradication is the goal, granular dieldrin is applied at the rate of 3 pounds of technical material per acre. This insecticide is dispensed by aircraft, ground, or hand equipment.

3. Accomplishments

A total of 421 acres was surface-treated in the town of Dahlonega, Lumpkin County, Georgia; this material was dispensed by Division-owned aircraft. The insecticide was furnished by the Georgia Department of Entomology. Small, isolated infestations elsewhere in the state were treated with dieldrin applied by hand seeders. In Tennessee, 200 acres were treated at

Chestnut Hill in the eastern part of the state. In North Carolina, 184 acres were treated and in South Carolina, 31 acres received the soil treatment. During the adult Japanese beetle flight season, foliage sprays were applied, in 16 eastern North Carolina counties and in 2 western North Carolina counties around produce markets, airports, and other hazardous areas. One area was surfaced-treated with granular dieldrin in the hope that this treatment would eliminate future foliage spraying for that area.

E. Regulatory

1. Objectives

The regulatory program designed to prevent further spread outside the regulated area is in two phases. The first phase regulating the movement of soil and nursery stock from the quarantined area, is in effect throughout the year. The second phase regulating the movement of fresh fruits and vegetables, aircraft, trucks, and railroad cars, is in effect only during the adult Japanese beetle season.

2. Procedures or techniques

During the adult season, state and federal inspectors were stationed in the areas under the seasonal Japanese beetle quarantine, where they made inspections, supervised the treatments required, and certified the produce carried by railroad cars and trucks out of the quarantined areas. During the year's adult season, the foliage sprays applied at airports kept the Japanese beetle population low and the fumigation of aircraft was not required.

Nurseries located in the quarantined areas required certification for plants going outside the area. For infested nurseries the quarantine requirements were met primarily by treating individual plants. This was accomplished by fumigation, and by injection and pour-on treatments. Some nurseries applied soil treatments which eliminated the necessity for treatment of individual plants.

3. Accomplishments

In the Carolinas, a program was started to soil-treat all the infested nurseries that are interested in out-of-state sales. Approximately one-third of the nursery acreage under this category in the state was treated, and the plants produced by these nurseries will be eligible for shipment outside the state without further treatment. The development of eradication programs had a good start throughout the infested states this year and should be encouraged during the fiscal year 1958.

F. Does not apply

G. Other

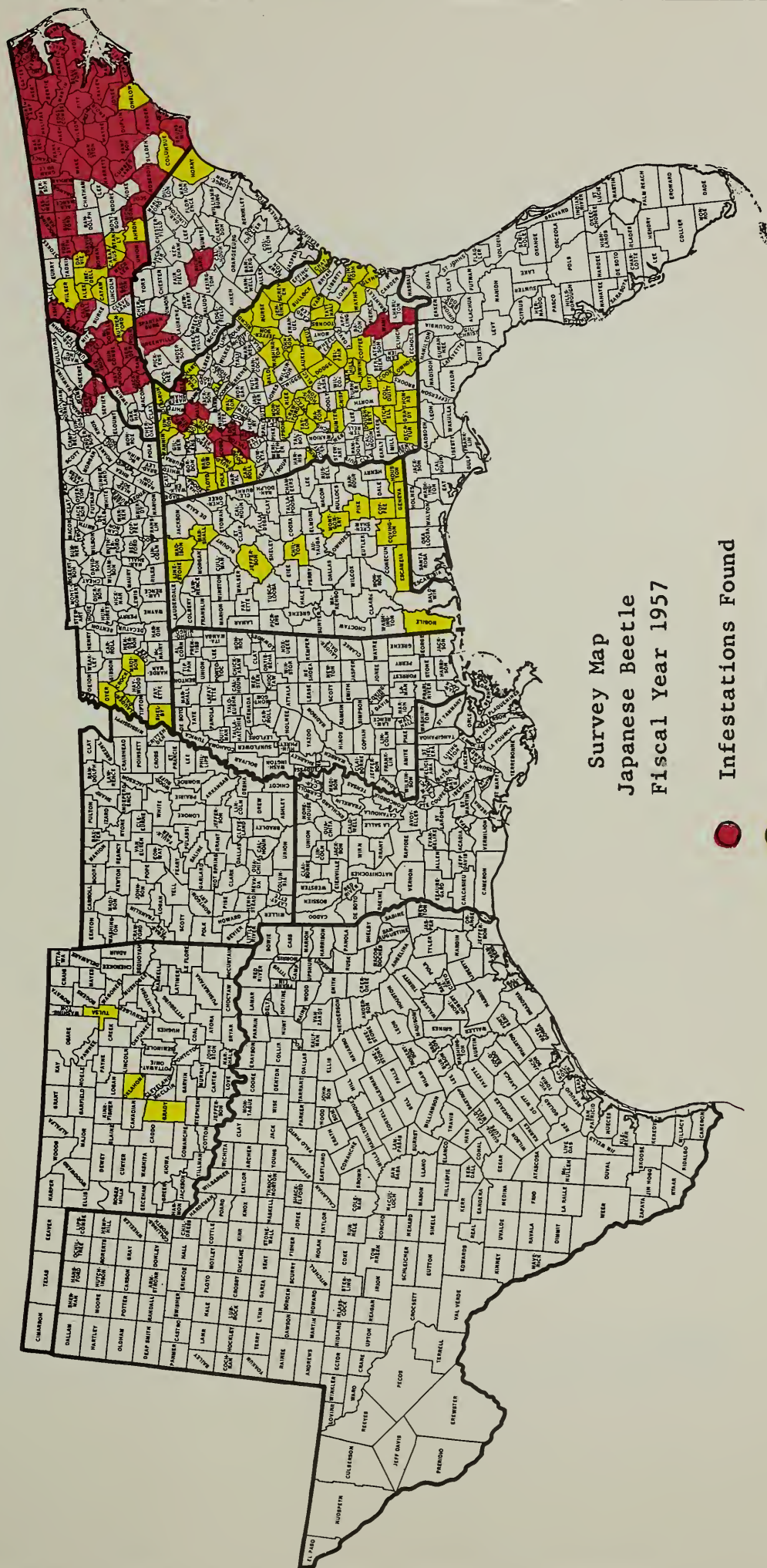
Dissemination of information by newspapers, radio, and television was used to some extent throughout the infested areas of the states in which Japanese beetle was a problem during the 1957 fiscal year. Greater effort along this line should be encouraged for 1958.

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Fiscal Year 1957

* During June 1957

SOUTHERN REGION PLANT PEST CONTROL DIVISION



USDA-ARS - Gulfport, Miss. 10/31/57

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
CENTRAL REGION

ANNUAL PROGRAM REPORT

KHAPRA BEETLE

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
and
State Departments of Agriculture
and
State Departments of Conservation

October 31, 1957
Minneapolis, Minn.

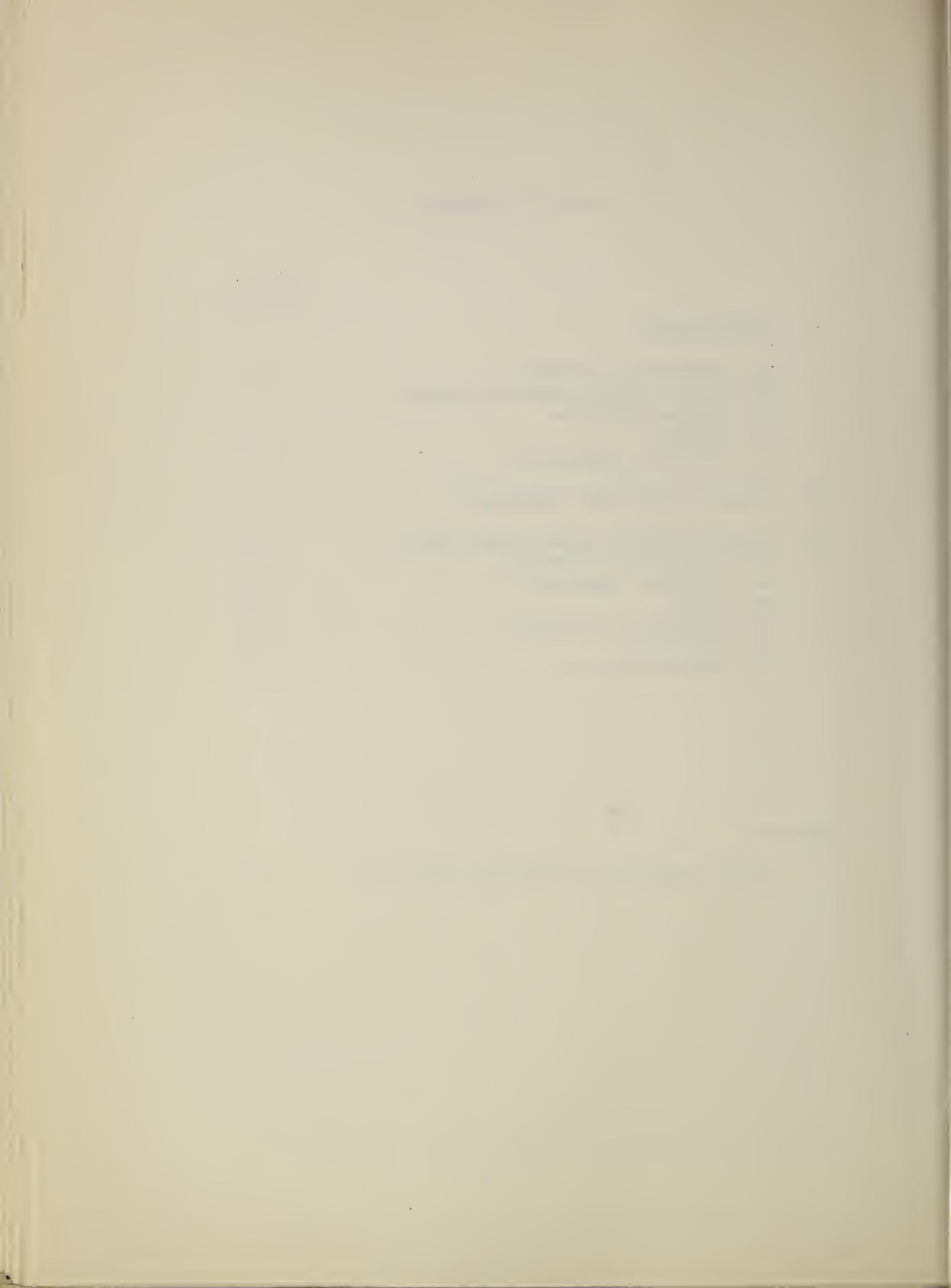
R. O. Bulger
Regional Supervisor

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I. INTRODUCTORY

A. Statement of Problem

The Khapra Beetle Program in the Central Region is concerned with the early detection of this pest, should it be or become established. The problem involves tremendous storage and grain processing facilities, presenting a nearly impossible task if all had to be inspected. Fortunately, the bulk of grain reaching these establishments comes from areas not known to be infested. There has been a limited amount of movement from the southwest, which has pointed toward an initial approach. We have searched records and traced grain movements and established a list of firms handling commodities that could have transported the khapra beetle to this region. We scheduled these for intensive inspection.

B. Program Justification Statement

The bulk of the grain industry is centered within the Central Plant Pest Control Region. Much of the grain going into processing plants is put into storage for extended periods of time. Even though the khapra beetle has not been found, there is evidence to show that it could establish itself and become a major pest in this area. Since it is extremely difficult to control, the khapra beetle could be our most serious stored-grain pest if it ever became established in our major terminals and other facilities.

C. Program Objective

1. The long-term objective is to be constantly on the alert for this pest and be prepared to take drastic steps to eradicate any that may be found.
2. During the past year, 1,645 establishments were given an initial inspection and 305 were reinspected. We feel that, coupled with our preliminary studies, we have conducted a reasonably adequate survey of the facilities in the region.

D. Changes

No changes are recommended for this program.

E. Status of Infestation

No infestation has been found. Three hundred forty-two questionable specimens were submitted for identification. All were negative.

II. PROGRAM HISTORICAL INFORMATION

This program began with training assignments for area supervisors and other personnel during the fall of 1955. They returned to their states to discuss the pest with their State cooperators and began to make plans for statewide surveys. The survey program began in the spring and summer of 1956. To date, cumulative totals for this program include 1,867 initial inspections, 306 reinspections, and 371 specimens submitted for identification. No infestations have been found.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

1. This program has been a joint effort on the part of the states and the Plant Pest Control Division. The states have provided manpower to make inspections and have participated in the planning. Before inspections were started, various State agencies opened their records to assist us in determining sources of grains and other commodities along with the receiving agency within the state. This service eased the task of establishing inspection priorities. The states arranged a schedule so some of their men could undergo a training period under our supervision. Inspections were jointly scheduled and have been accomplished as time permitted in connection with the regularly assigned duties.

B. Technical Assistance

1. Since a positive determination of species depends upon a highly skilled taxonomist, we have not drawn on this service from the states. All identifications have been made by taxonomists assigned to this work by the National Museum. The states have, however, provided personnel with the necessary background experience to qualify them as inspectors.
2. It has been the responsibility of the Division to train inspectors for this work. We have also furnished information to the general public, designed to alert them to the problem and a course of action to take if they found stored products pests resembling the khapra beetle.

C. Survey

The survey has been designed for detection. Each premise inspected was carefully examined visually. Cracks were probed, accumulations of dust and debris were sifted, and all cast skins, living specimens, and adults of the dermestid family were collected for identification.

D. Eradication or Control

If the khapra beetle had been found, immediate steps would have been taken to eradicate the infestation.

E. Regulatory

If the survey had revealed an infestation of the khapra beetle, immediate steps would have been taken to place the premise under quarantine.

F. Recommendations

1. The survey for khapra beetles should be continued in the Central Plant Pest Control Region.
2. Reinspections should be scheduled and funds made available for this work in 1958.

Summary of Associated Activities - Fiscal Year 1957

| States | : Public : | Presentations | | | : Feature : | Extent These Aids Were Used** | | |
|--------------------|-------------|---------------|---------|--------|-------------|-------------------------------|---|-----|
| | : Meetings: | : : : | : : : | : : : | : & News : | : Bulle-:Circu-:Infest.Maps | | |
| | : Attended: | Talks: | Slides: | Films: | Radio: | TV | : Stories*: Exhibits: tins*: lars*: & Posters | |
| <u>FEDERAL</u> | | | | | | | | |
| Michigan | - | 1 | - | - | - | - | 97 | - |
| Missouri | - | - | - | - | - | - | 30 | - |
| North Dakota | 1 | 1 | - | - | - | - | - | - |
| Ohio | - | 6 | 12 | - | 1 | - | 50 | - |
| South Dakota | 1 | 1 | - | - | - | - | - | - |
| Wisconsin | - | - | - | - | - | - | 25 | - |
| Subtotals | 2 | 9 | 12 | - | 1 | - | 177 | 25 |
| - | - | - | - | - | - | - | - | - |
| <u>COOPERATORS</u> | | | | | | | | |
| Missouri | - | - | - | - | - | 1 | 10 | - |
| North Dakota | 1 | - | - | - | - | - | - | - |
| South Dakota | 1 | - | - | - | - | - | - | - |
| Wisconsin | - | - | - | - | - | - | 200 | - |
| Subtotals | 2 | - | - | - | - | 1 | 10 | 200 |
| GRAND TOTALS | 4 | 9 | 12 | - | 1 | - | 187 | 225 |

*Written by Federal personnel for release direct or through cooperators.

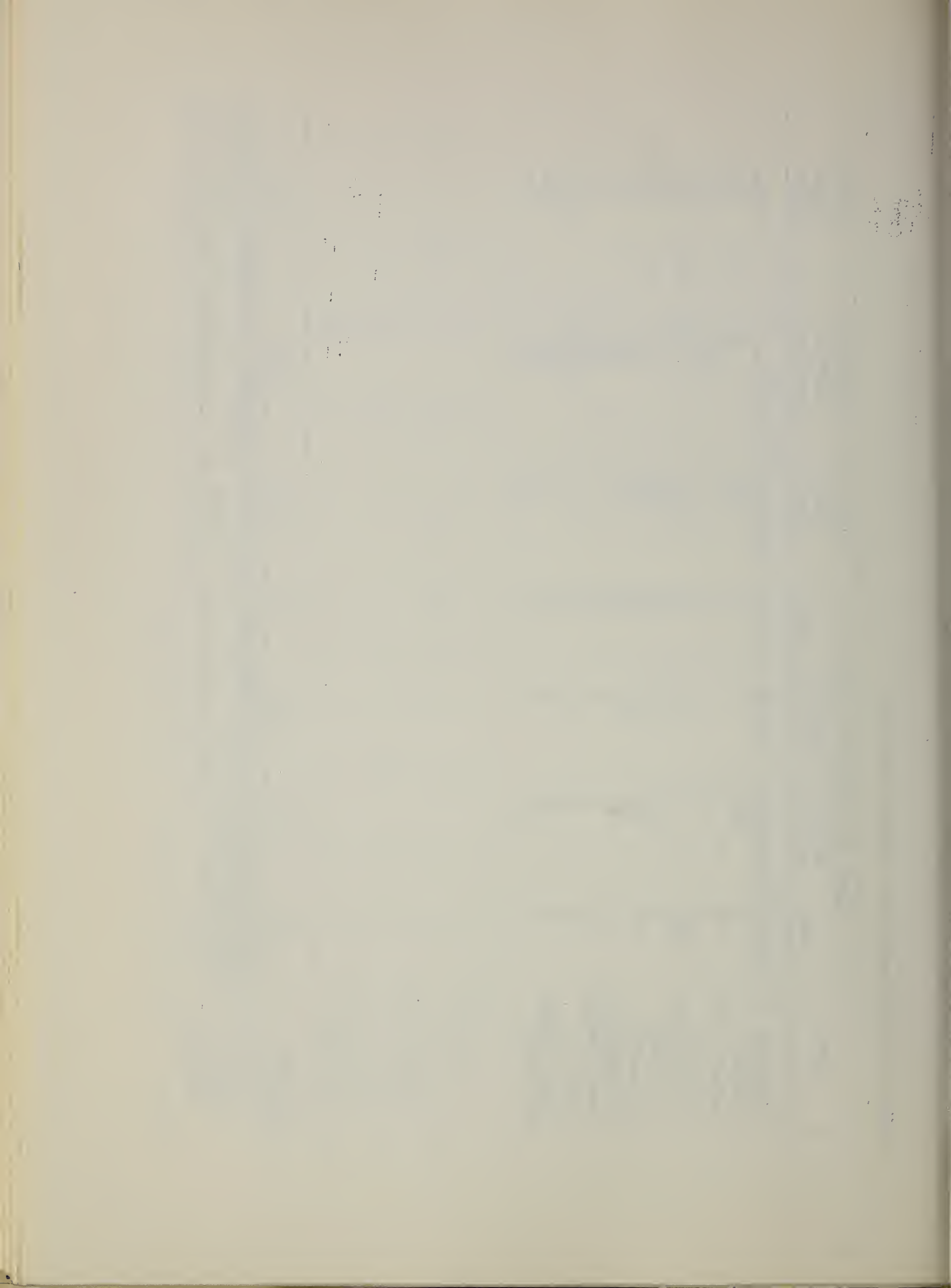
**Conservative estimate.

Cooperative Aid Received - Fiscal Year 1957

| State | Cash and Equivalent Aid* | | | | Total of : | | | Intangible : | | Source |
|--------------|--------------------------|--------|--------------------------|---|-------------|-------|----------------|--------------|---------|--------|
| | : Cash | | : Personal : Equipment : | | : Cash & : | | : Service | | : Grand | |
| | : Services : | | : & Supplies: | | : Equiv.* : | | : Estimate** : | | : Total | |
| Illinois | \$ 0 | \$ 161 | \$ 0 | 0 | \$ 161 | \$ 0 | 0 | \$ 161 | \$ 161 | |
| Indiana | 0 | 135 | 0 | 0 | 135 | 0 | 0 | 135 | 135 | |
| Kansas | 0 | 0 | 0 | 0 | 0 | 700 | 0 | 700 | 700 | |
| Kentucky | 0 | 0 | 0 | 0 | 0 | 1,500 | 0 | 1,500 | 1,500 | |
| Michigan | 415 | 0 | 0 | 0 | 415 | 0 | 0 | 415 | 415 | |
| Minnesota | 0 | 100 | 0 | 0 | 100 | 0 | 0 | 100 | 100 | |
| Missouri | 0 | 550 | 100 | 0 | 650 | 150 | 0 | 800 | 800 | |
| Nebraska | 0 | 0 | 0 | 0 | 0 | 700 | 0 | 700 | 700 | |
| North Dakota | 0 | 0 | 0 | 0 | 0 | 600 | 0 | 600 | 600 | |
| Ohio | 0 | 0 | 0 | 0 | 0 | 1,000 | 0 | 1,000 | 1,000 | |
| South Dakota | 0 | 0 | 0 | 0 | 0 | 600 | 0 | 600 | 600 | |
| Wisconsin | 0 | 100 | 0 | 0 | 100 | 600 | 0 | 700 | 700 | |

*Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.



Expenditures by Source and by Activity - Fiscal Year 1957

[illegible]

CASH & EQUIVALENT*

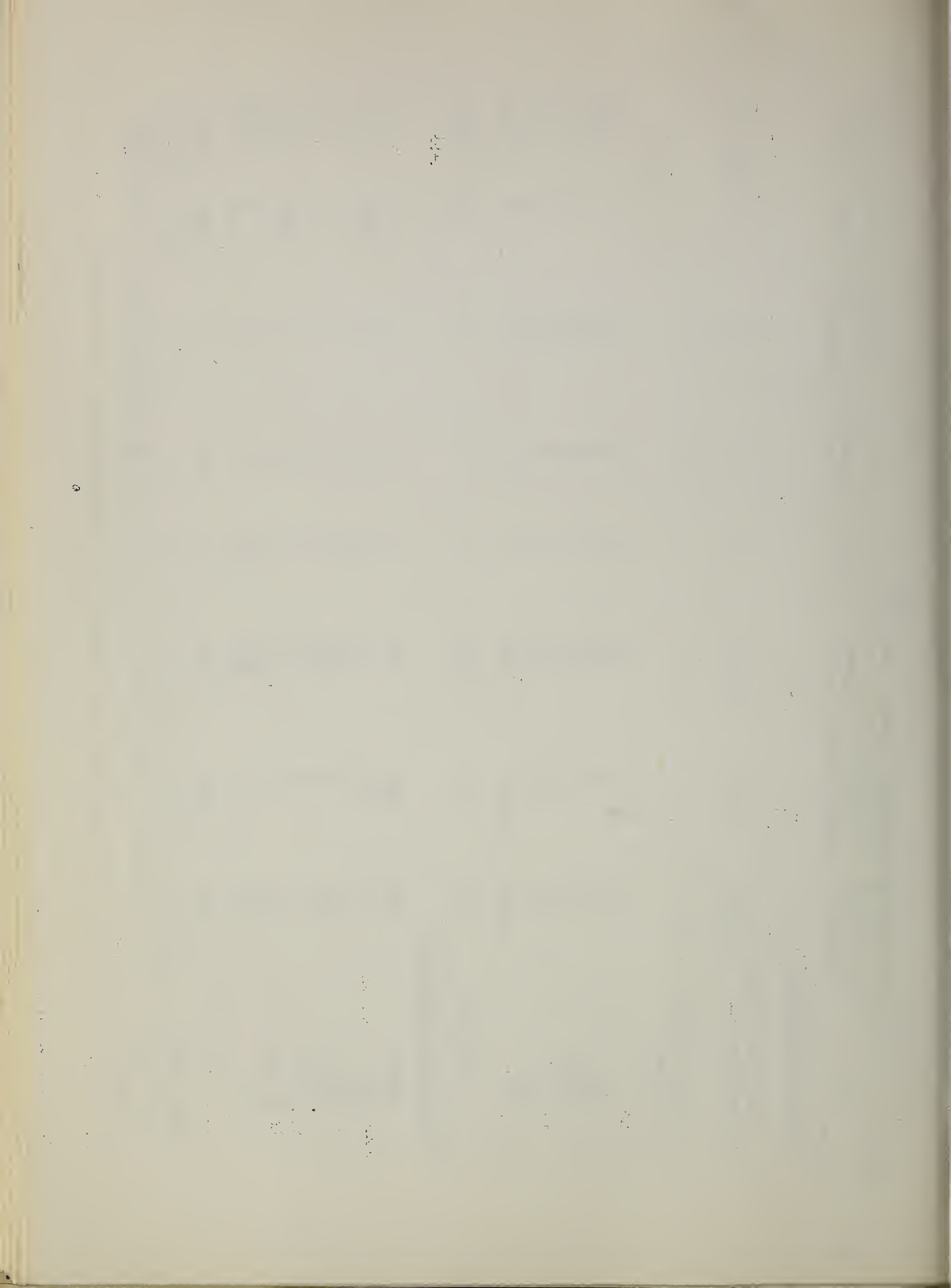
| Plant Pest Control
Division | \$2,000 | \$1,700 | \$18,000 | 0 | 0 | 0 | 0 | \$21,700 |
|--------------------------------|---------|---------|----------|---|---|---|---|----------|
| Other Organi-
zations: | | | | | | | | |
| Ill. | 0 | 0 | 161 | 0 | 0 | 0 | 0 | 161 |
| Ind. | 0 | 0 | 135 | 0 | 0 | 0 | 0 | 135 |
| Mich. | 0 | 0 | 415 | 0 | 0 | 0 | 0 | 415 |
| Minn. | 0 | 0 | 100 | 0 | 0 | 0 | 0 | 100 |
| Mo. | 150 | 50 | 450 | 0 | 0 | 0 | 0 | 650 |
| Wis. | 0 | 0 | 100 | 0 | 0 | 0 | 0 | 100 |
| Subtotals | 150 | 50 | 1,361 | 0 | 0 | 0 | 0 | 1,561 |

CONTRIBUTED SERVICES**

| | | | | | | | | |
|--------------|---------|---------|----------|---|---|---|---------|----------|
| Kans. | 100 | 100 | 500 | 0 | 0 | 0 | 0 | 700 |
| Ky. | 0 | 500 | 0 | 0 | 0 | 0 | 1,000 | 1,500 |
| Mo. | 0 | 0 | 150 | 0 | 0 | 0 | 0 | 150 |
| Nebr. | 100 | 0 | 600 | 0 | 0 | 0 | 0 | 700 |
| N. Dak. | 100 | 0 | 500 | 0 | 0 | 0 | 0 | 600 |
| Ohio | 0 | 0 | 0 | 0 | 0 | 0 | 1,000 | 1,000 |
| S. Dak. | 100 | 0 | 500 | 0 | 0 | 0 | 0 | 600 |
| Wis. | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 600 |
| Subtotals | 400 | 600 | 2,850 | 0 | 0 | 0 | 2,000 | 5,850 |
| GRAND TOTALS | \$2,550 | \$2,350 | \$22,211 | 0 | 0 | 0 | \$2,000 | \$29,111 |

*Direct appropriation, allotments other sources, services & supplies for which there is actual cash expenditure.

****Services incidental to other activities, for which only an estimated value is available.**



Revised

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
EASTERN REGION

ANNUAL PROGRAM REPORT

KHAFRA BEETLE

July 1, 1956 - June 30, 1957

COOPERATING AGENCIES:

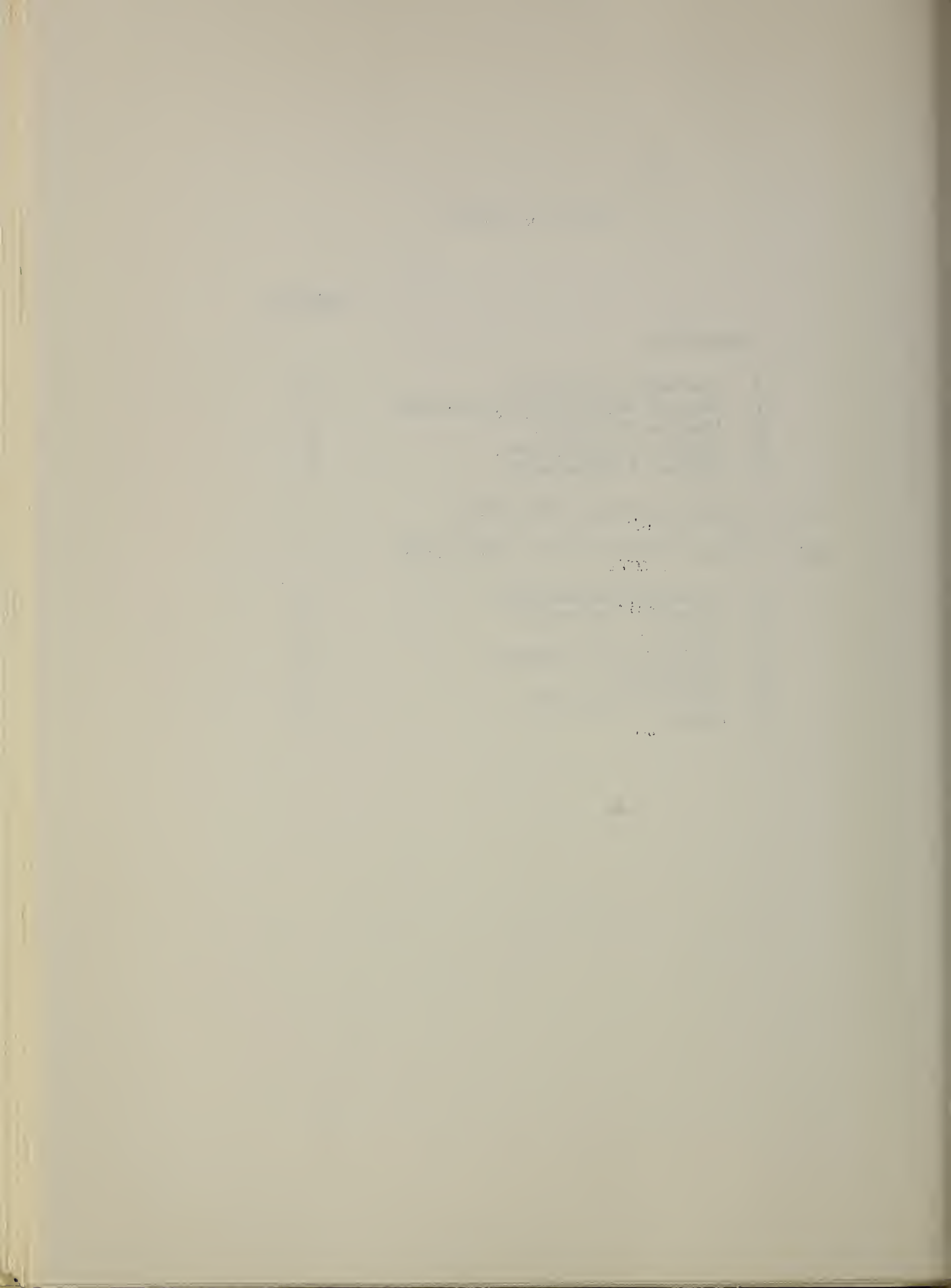
Plant Pest Control Division, Agricultural Research
Service, U. S. Department of Agriculture
and
State Departments of Agriculture

December 1957
Moorestown, New Jersey

H. L. Smith
Regional Supervisor

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I. INTRODUCTORY

A. Statement of the Problem

The khapra beetle problem in the Eastern Region consists at present of the possibility of this pest becoming established in grain storage areas. Most such storage places are in connection with the manufacture of commercial feed, storage for seed, and short-term storage for export.

B. Program Justification Statement

Should it become established in the Northeast it could not only destroy large quantities of grain and seed but would probably result in severe restriction on grains and other related products.

C. Program Objective

1. The long-term objective is continued survey for the pest, disseminate information concerning it to state and private individuals involved, and keep abreast of control measures in order that prompt and effective eradication could be accomplished should it be found.
2. During this fiscal year and the preceding one emphasis was placed on the inspection of grain and seed storage establishments and the study of the movement of products likely to carry this pest from the Southwest or from Europe into the Region.

D. Changes from Work Plan

No changes from the above objective are recommended in the light of the present knowledge and available information.

E. Status of Infestation

No infestation has been found in the Region. Inspections were made at 311 establishments and 275 specimens submitted for identification. In addition, it is known that many inspections were made by public and private individuals, but were not reported.

II. PROGRAM HISTORICAL INFORMATION

The first organized survey in this Region was begun early in 1956 when a nationwide survey was planned at a meeting in Denver, Colorado, in March of that year. As conditions permitted, individuals were sent to the Western Region on temporary assignment to do khapra beetle survey and control work. In the Southwest specimens and informational literature were distributed to cooperating organizations. It was found that relatively little grain, as such, is shipped from the infested area

to the Eastern Region, however, large quantities of certain agricultural seeds, as such, as well as freight cars and other vehicles, could provide the means of moving the infestation eastward. State regulatory people as well as the large commercial interests are alerted to this problem, and this cooperative interest must be maintained for several more years.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

Planning and directing the survey in this Region during the reporting period was a continuation of the work planned on a national scale in March 1956. More detailed plans were made by Division personnel and the various state regulatory officials on a cooperative basis. Most of the survey work was performed during the winter months by State or Federal men on temporary assignment, as well as inspections throughout the year which were performed incidental to other duties. This appears to be the best plan of work and will be continued throughout the foreseeable future.

B. Technical Assistance

The technical assistance received in this Region consisted primarily of the identification of specimens by the National Museum. Survey methods employed were essentially those developed in the Southwest. Division personnel who have worked in the Southwest have trained other Federal and cooperating state personnel in survey techniques. Information on the insect was furnished to the general public.

C. Survey

This is purely a detection survey and the procedures used were those developed in the Southwest. It consists of a conference with the person in charge of the premises at which time information is obtained regarding the source of their grain or other products. At the same time he is informed regarding the khapra beetle and its damage potential. A visual examination is made of the premises and specimens which in any way resemble the khapra beetle are collected and submitted for identification. 310 inspections were made and 275 specimen collections submitted. Since the survey was negative there were no known losses from this pest in the Region. It is believed that a sufficient amount of survey can be performed in the future under present conditions--during winter months and incidental to other duties.

D. Eradication or Control

The probable course of action in the event infestation is found is considered and discussed periodically with cooperating state agencies. Should an outbreak be found we would in all probability request technical assistance of experienced personnel at least in the beginning of an eradication program.

E. Regulatory

No quarantines other than the Federal quarantine are in effect. State and Federal personnel are constantly alerted for the arrival of material from the Southwest as well as the possibility of contaminated common carrier vehicles.

F. Methods Improvement

No work for such is planned in this Region but we are attempting to keep abreast of the changes that are developed in the area of infestation.

G. Other

The interest shown by state, county, and other cooperating personnel as well as the owners of mills and storage establishments has been far above our expectations. At least as many inspections were made by state personnel as by federal. Feedmills and owners of storage places connected with the export business were particularly interested in the work. The presence of this pest, although some two thousand miles away, together with the inspections has resulted in sanitary measures in many of the establishments which probably would never have been carried on otherwise. This is particularly true of the smaller establishments. These surveys have also resulted in the finding of other pests which in some cases were not known to be present.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

Region EASTERN

KHAPRA BEETLE

Fiscal Year 1957

SUMMARY OF REGIONAL FIELD ACTIVITY

| State | Inspections | | | Specimen
Collections
Submitted
for Ident. | Sites
Infested |
|---------------|-------------|--------|-------|--|-------------------|
| | Initial | Repeat | Total | | |
| Connecticut | - | - | - | - | - |
| Delaware | - | - | - | - | - |
| Maine | 6 | - | 6 | - | - |
| Maryland | 3 | - | 3 | - | - |
| Massachusetts | 6 | - | 6 | 1 | - |
| New Hampshire | - | - | - | - | - |
| New Jersey | 17 | - | 17 | - | - |
| New York | - | - | - | - | - |
| Pennsylvania | 19 | - | 19 | 18 | - |
| Rhode Island | - | - | - | - | - |
| Vermont | - | - | - | - | - |
| Virginia | 229 | 1 | 230 | 236 | - |
| West Virginia | 29 | - | 29 | 20 | - |
| Total | 309 | 1 | 310 | 275 | 0 |

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

MEXICO REGION FOR COOPERATIVE PROGRAMS
ANNUAL PROGRAM REPORT

KHAPRA BEETLE

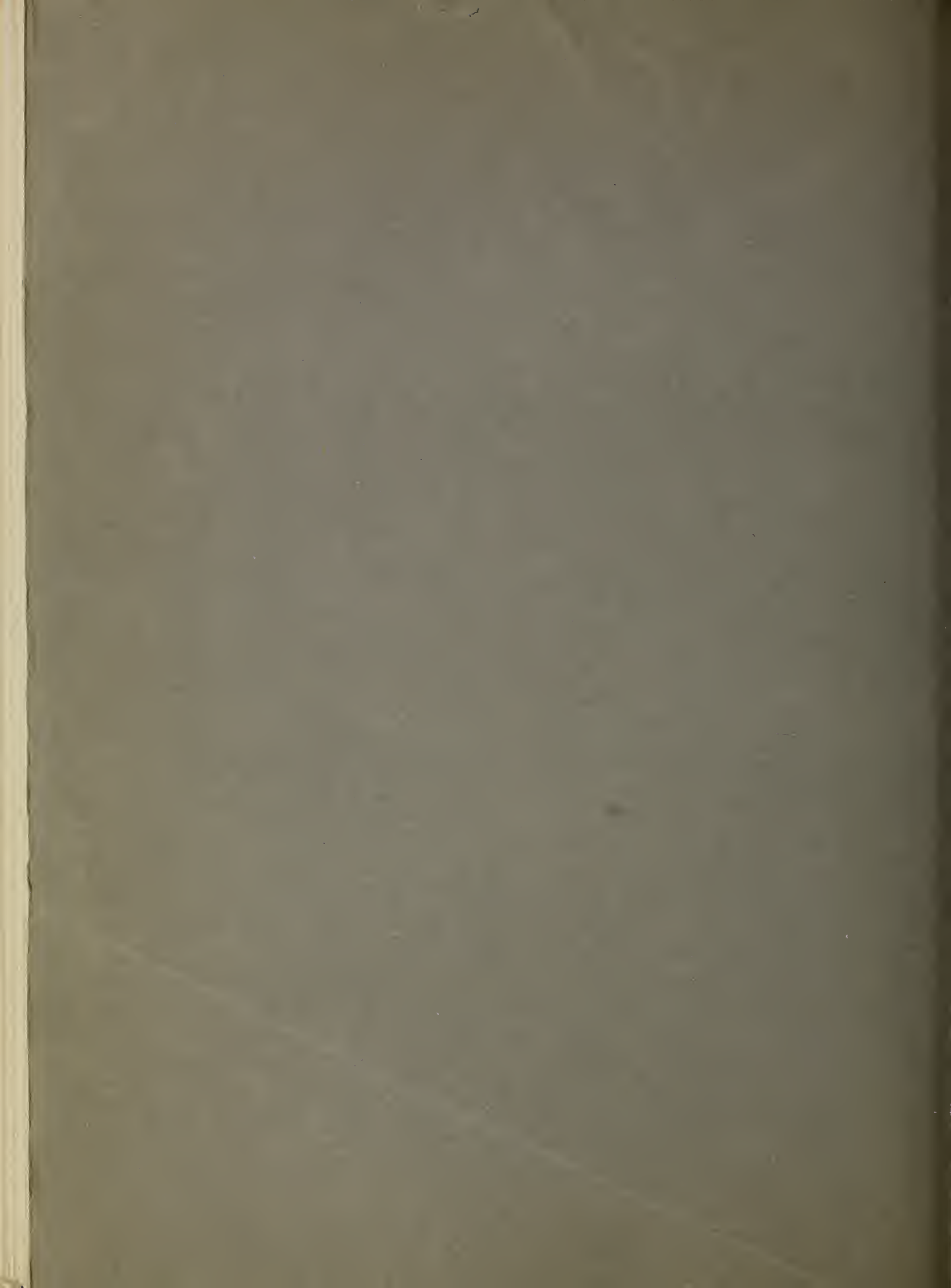
July 1, 1956 - June 30, 1957

Cooperating Agencies:

MEXICAN DEFENSA AGRICOLA

September 16, 1957
Monterrey, N. L., Mexico

W. K. Clore
Regional Supervisor



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

MEXICO REGION FOR COOPERATIVE PROGRAMS
ANNUAL PROGRAM REPORT

KHAPRA BEETLE

July 1, 1956 - June 30, 1957

Cooperating Agencies
MEXICAN DEFENSA AGRICOLA

September 16, 1957
Monterrey, N. L., Mexico

W. K. Clore
Regional Supervisor



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INTRODUCTORY

Statement of Problem

The khapra beetle is native to India, and from there it has spread to various European and Asiatic countries. It is considered the most destructive of all storage pests, and the most difficult to control. Infestations in Mexico are apparently limited to the Mexicali, Baja California and San Luis Colorado, Sonora areas. This area is contiguous to the Arizona-California areas of the United States where a vigorous eradication program has been in effect since its discovery in California in 1953. Therefore, it is imperative that equally vigorous detection survey and eradication efforts be carried out in the adjoining areas in Mexico to secure the success of the program in the United States and prevent further spread in Mexico. The problem is mutual and requires that the two countries work cooperatively for the common goal.

Program Justification

As a result of surveys it was revealed that infestations of khapra beetle were present in Mexicali, Baja California, and San Luis Colorado, Sonora, in Mexico. These areas are contiguous to the khapra beetle infested areas of California and Arizona and are therefore a problem of mutual concern to the two countries. It is obvious that if the beetle is to be eradicated in Arizona and California that the same procedures be carried out cooperatively in Mexico in order to assure that the costly eradication program in the United States has the maximum opportunity for success.

Program Objective

Long Term Objective - The ultimate aim of the program is eradication of the khapra beetle from the North American continent.

For the Reporting Year - The problem of eradication is clearly a mutual one for the United States and Mexico, since the presently known infestations exist in neighboring states of the two countries. Therefore, in order that the objective be attained, the program should be coordinated, and the work in Mexico is coordinated with that in the states and cooperative as to procedure and participation.

Surveys were made during the year to detect and delimit infestations in Baja California and Sonora. Methyl bromide fumigations were made of infested properties to eradicate the pest. Restrictions were placed on properties found to be infested in accordance with the Mexican Int. Quarantine #10, to prevent the spread of the beetle from infested properties.

Status of Infestation

At the end of the year only three properties known to be infested with the khapra beetle remained to be fumigated and plans were already under way to carry out eradivative fumigations on the properties. All of these infestations were in the Mexicali, Baja California area.

A sharp drop in the number of infestations present in Baja California and Sonora occurred during the fiscal year. From January to June 30, 1956 a total of 36 infestations was found in the six-month period as compared to the 12 infestations found in the twelve-month period for the 1957 fiscal year.

PROGRAM HISTORICAL INFORMATION

The khapra beetle is acknowledged to be the world's most destructive pest of stored grain products and most difficult to control by ordinary methods. When it was found to have become established in California, Arizona, and New Mexico, work was initiated to effect its eradication, and to prevent further spread. In the efforts to delimit the infestation, it was felt that inspections were necessary in the neighboring states of Baja California. Officials of the Plant Pest Control Division discussed the problem with the Mexican authorities and a cooperative detection survey work plan was agreed upon. Early in 1956 surveys were started and quickly revealed that khapra was present in several properties in Mexicali, Baja California, and one in San Luis Colorado, Sonora. Mexican Khapra Beetle Interior Quarantine #10, patterned after the United States Federal Quarantine, restricting movement of products from the infested properties, was imposed by the Mexican authorities. Work of eradication was begun in June and an eradication program was begun by the governments of Mexico and the United States and affected industries. The essentials of the cooperative eradivative program were performed as carried out in the United States.

At the end of the 1957 fiscal year the cooperative work of surveys and eradication was continuing as initiated. Plans were that it proceed in the same manner for the coming year.

The reorganization of the Plant Pest Control Division brought about changes in the direction of the program. In November, technical supervision of fumigations became the responsibility of the Western Region, while surveys were under the direction of the Western Mexico Area. After January 1, 1957 the responsibility for all survey and control work on the khapra became that of the Western Mexico Area.

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PROGRAM ACTIVITY DURING FISCAL YEAR

Planning and Direction

The planning and direction of the khapra beetle program as carried out in Baja California and Sonora is cooperative in all its phases. The Area Supervisor of the Western Mexico Area plans and directs the various operations with the Chief of the Northwest Protective Zone of the Mexican Defense of Agriculture. The two representatives of their respective government agencies meet often for consultation, and correspondence serves to supplement their meetings. The two supervisors make visits together to observe the various operations. The relationship is harmonious and decisions are as a result of agreement on procedures of operation and assignments and responsibilities of personnel under joint supervision.

District Supervisors work in cooperation with the local Delegados of the Mexican Defense of Agriculture in carrying out the work within the limitations of the joint planning of the two supervisors. District Supervisors make periodic reports to keep the Area Supervisor advised of work progress. Through discussions, visitations, and correspondence, the Area Supervisor is enabled to keep District Supervisor fully informed as to plans. The Area Supervisor maintains a constant check of the expenditures of the funds available, to have a control that assures their best use in the furtherance of the work aims.

Technical Assistance

Fumigation procedures in the overall eradication treatment used to free infested establishments of the khapra beetle were originated through research conducted by Agricultural Marketing Service and California and Arizona Experiment Stations.

Surveys

Objective

The survey is for the purpose of detecting the khapra beetle and to delimit the infestations found. Following fumigations to eradicate the pest in an establishment, additional surveys are made at ninety-day intervals to check the fumigated establishments for survival or reintroduction of khapra beetle.

Procedures

Field - Inspections of establishments susceptible to infestations of the khapra beetle are made by crews of men. Inspections are made of mills, warehouses, farms, ranches, and all handlers of grains. Owing to the pest's habit of congregating in tight places such as cracks, nail holes, and other similar places, inspections must be made very carefully.

THE UNIVERSITY OF CHICAGO

CHICAGO, ILL.

TO THE PRESIDENT OF THE UNIVERSITY OF CHICAGO
FROM THE FACULTY OF THE UNIVERSITY OF CHICAGO
The Faculty of the University of Chicago, in a meeting held on the 15th day of May, 1906, at the University Hall, Chicago, Illinois, have adopted the following resolution:

Resolved, That the Faculty of the University of Chicago, in a meeting held on the 15th day of May, 1906, at the University Hall, Chicago, Illinois, have adopted the following resolution:

Resolved, That the Faculty of the University of Chicago, in a meeting held on the 15th day of May, 1906, at the University Hall, Chicago, Illinois, have adopted the following resolution:

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Therefore, inspections are inherently time consuming. In April, traps were added to survey procedure when 100 burlap bags were placed in five important installations in Mexicali. Periodic examinations have failed to reveal khapra in or on the bags.

Accomplishments

In Baja California inspections were carried out in three municipios. There was a total of 1864 inspections made in Baja California, 1755 of these being initial inspections, and 109 repeats. Whereas, in Sonora, of the 86 inspections carried out in 9 municipios, 85 were initial, with one repeat. In Baja California, of the 357 specimens submitted, 12 were identified as khapra, and 42 specimens from Sonora were all negative. (Refer to statistical tabulation in Appendix.)

Eradication or Control

Objective

The objective of the program is unequivocally one of eradication of the pest from the North American continent, and while eradication is being carried out, the aim is prevention of further spread.

Procedures

Upon finding an establishment to be infested, the first step is to impose Mexican Khapra Beetle Interior Quarantine #10 to prevent spread of the khapra to other properties. Once the quarantine is in effect, arrangements are begun to fumigate the property.

Fumigations are carried out in the following manner, generally under contract: The entire structure is covered with gas tight tarpaulins, rolled together at edges and clamped to provide a tight seal. Three feet out from the base of the building, periphery of the tarp is buried under 18 inches of soil in a shallow ditch around the building, and the soil wet down to provide a more effective seal.

Prior to covering the structure with tarps, an area 100 feet surrounding the structure or to the property line, whichever is lesser, is sprayed at three to seven day intervals, using a spray consisting of 5 lbs. of actual malathion to each 100 lbs. of diesel or fuel oil until thoroughly wet. Water may be used instead of oil, depending on surface to be sprayed or other circumstances, however, oil is more desirable. The surface is freed of all general debris by raking the debris toward the building, the material to be under tarp during fumigation. Two spray operations are given prior to fumigation and the final one after the structure to be fumigated has been covered. All structures of related usage on an infested property are likewise covered and spray

procedure carried out as outlined. Circulation systems are placed in building or buildings to be fumigated, to facilitate distribution of gas. Material in buildings is stacked, where feasible, to spread the material out over wider area and assure more uniform circulation of gas through material. Probes on lines leading outside building are placed in selected points in material and in the free air in structure, connected to an instrument outside building which shows gas concentration to provide information during fumigation on gas concentration in several points in the building and the material. Sampling probes are placed at top, center, and bottom of material throughout interior of building. Methyl bromide gas is used and gas concentrations are taken during process of fumigation at prescribed intervals of 2, 4, 6, 12, 18, 24, and 48 hours after gas introduction, and the methyl bromide gas concentrations are retained at above 32 oz. per 1000 cu. ft. for not less than 24 continuous hours during the 48 hour period. Gas is added during the course of the 48 hour period to maintain concentrations required, if it is found to be necessary.

There are three categories of treatment for eradication of an infestation on a property. Category One designation is as generally described above. A Category Two fumigation corresponds to Category One fumigation, except that less than all of the buildings of related usage that comprise the property may be fumigated, when in the judgment of the responsible representative supervising the work eradication may be accomplished by such a procedure. There is a third category which permits interior fumigations by sealing all openings and conducting the fumigation without benefit of tarpaulins or polyethylene sheeting. However, this procedure has not been used in Mexico. Only one eradication fumigation carried out in Mexico carried other than a Category One designation. The Category Two fumigation is not released until at least three inspections at 90-day intervals have been carried out in the year following the fumigation.

Accomplishments

During the year 43 infested sites were treated and 42 were released from quarantine restrictions. One, with a Category Two designation, was fumigated in accordance with the rules set forth by its designation and will be released if the final 90-day inspection reveals no infestation to be present. Three properties remained at the end of the year to receive the methyl bromide fumigation. (Refer to statistical tabulation in Appendix.)

Regulatory

Objectives

The objective of the regulatory phase of the program is essentially to prevent the spread of the khapra beetle to uninfested sites and areas.

Procedures

The program is from authority granted and defined under Interior Mexican Quarantine #10. The quarantine is similar to the USDA khapra beetle quarantine in operation in the United States. It is unique, however, in that in contrast to other quarantines for other insects, its provisions are principally for the restriction of movement of products from infested sites, rather than from areas designated as infested. However, this is qualified to an extent in that certificates of treatment or cleanliness for susceptible products moving out of the Mexicali, B. C., and San Luis Colorado, Sonora, areas into other areas in Mexico. The Defense of Agriculture of Mexico personnel issue certificates for movement of host material upon ascertaining origin and if from an infested site, if the products have been methyl bromide fumigated in accordance with the provisions of the regulations. Products from an infested site may move after they have released the property following treatment as indicated in one of the three categories.

Materials regulated by the quarantine, packaged in sacks, multiwalled paper bags, shipping cartons, or other containers not containing a non-permeable layer such as polyethelene or cellophane film, wax paper, or tar, may move from an infested site providing it be given a quarantine treatment. In the Mexicali area there are six fumigation chambers, built to conform to rigid specifications as to type of construction, air tightness, and type of seal. These chambers have been installed by mill owners, or warehouse owners to provide movement of products from their premises prior to fumigation of premises, or to fumigate used sacks and other susceptible items moving into their premises. Quarantine fumigations carried out in these chambers in conformance to the requirements also allow movement out of the area of host material. A quarantine fumigation may also be made under tarps treated to prevent the escape of gas. Chamber fumigations use methyl bromide gas with a minimum application of 2.5 lbs. of gas per 1000 cu. ft. at a temperature of the commodity of 90 degrees Fahrenheit. Minimum concentration for twelve hours is 15 ounces. The same procedure is outlined for products to be fumigated under tarpaulin. For finely milled products where concentration is difficult to obtain, suggested rate of application is 4 lbs. per 1000 cu. ft. at 90 degrees F. or above, and a minimum concentration of gas of 10 oz. for 24 hours. The lower the temperature of the commodity in the various procedures of quarantine shots outlined, the greater the dosage per 1000 cu. ft. and the higher the concentration of gas to be maintained for the minimum time required.

At the quarantine station at San Luis Colorado, Sonora, cooperatively operated for the inspection of northbound traffic, southbound trucks carrying susceptible cargo are checked to determine if they are carrying khapra beetle host material and if so, if the product carries the proper certificate from the Mexican authorities as to origin or treatment of the product.

Prior to July 1956 any material capable of carrying khapra beetle, shipped to the United States from the Mexicali, B. C. and San Luis Colorado, Sonora areas required a certificate of non-contamination or of fumigation signed by a Plant Pest Control Division inspector. However, once fumigation of infested properties was initiated in those areas, the Plant Quarantine on the American side was issued a list of infested establishments, and entry of host material was permitted if the material did not originate from an infested property. As properties were fumigated they were removed from the prohibited list and as other infestations were found they were added to the list. This procedure for movement of products is similar to that being carried out in the United States.

Accomplishments

During the year, surveys carried out revealed a total of 12 localities to be infested. There was a total of 44 infested establishments fumigated during the year and released, while at the end of the 1957 fiscal year, three establishments remained on the list as untreated. Since it was planned that they shortly be fumigated they will also be released. One property remains in Category Two and will be released following the final 90-day interval inspection.

Other

Cooperation

The work is cooperative in all its aspects and is a joint operation of the Plant Pest Control Division and the Mexican Defense of Agriculture. The Defense of Agriculture shares in salaries of Mexican Nationals hired for survey and for assistance in fumigation of infested establishments. Supervisory personnel for some phases of the work is furnished by the Defense of Agriculture and while costs of contracts let to private companies to cover infested establishments to be fumigated are paid by the Plant Pest Control Division, the Mexican Defense of Agriculture in cooperation with industry as represented by the Mexican Cooperative Committee against the khapra pays for all methyl bromide gas used. They also furnished office space for the District Supervisor and limited storage for some equipment.

Funds Spent

Federal - A total of \$146,253 was spent the past year in the program to eradicate the khapra beetle in Mexicali, B. C., and San Luis Colorado, Sonora. The greater portion of these funds was expended in control work primarily eradication fumigations. Second to this expenditure was the cost of survey operations. All of the federal monies expended on the program were from the contingency fund. Funds spent during the year were well in excess of the previous years, inasmuch

as the cooperative program did not get under way until January 1956 and only one of the fumigations was carried out in the 1956 fiscal year. (Refer to statistical tables in Appendix.)

Cooperative - The Mexican Defense of Agriculture expended \$41,568.64 during the fiscal year and drew on local industry as represented by the Mexican Cooperative Committee Against the Khapra for \$20,628.03. Thus, cooperative expenditures represented a total of \$62,196.67. The major portion of this total was for the purchase of methyl bromide gas for fumigations. (Refer to statistical tables in Appendix.)

Meetings

The Regional Supervisor for the Mexico Region for Cooperative Programs, the Supervisor for the Western Mexico Area, the Supervisor for the Mexicali, B. C. District, and the Chief of the Northwest Mexico Protective Zone all attended the Khapra Beetle Conference held in Yuma, Arizona, August 2, 1956. Representatives from the Plant Pest Control Division, Washington, D. C., Mr. Randall Latta and associates from Stored Products Division, Agricultural Marketing Service, representatives of the Western Region, Plant Pest Control Division, and agricultural officials of the States of Arizona, California, and New Mexico, participated in the conference.

A second khapra beetle conference was likewise held at Yuma, Arizona on June 17 and 18, 1957, at which representative of all agricultural agencies concerned with the detection and eradication program representing the States of Arizona, New Mexico, and California, United States Department of Agriculture, and the Defense of Agriculture of Mexico were present. The Mexico Region for Cooperative Programs was represented by the Assistant Regional Supervisor, the Western Area Supervisor, his Assistant, and the Mexicali District Supervisor.

UNITED STATES DEPARTMENT OF AGRICULTURE
 AGRICULTURAL RESEARCH SERVICE
 PLANT PEST CONTROL DIVISION

Region - Mexico

KHAPRA BEETLE

Fiscal Year 1957

INSPECTIONS

| State | Inspections | | | Specimen Collections Submitted for Ident. | Sites Infested | Remarks |
|---------------------------------|-------------|--------|-------|---|----------------|---------|
| | Initial | Repeat | Total | | | |
| BAJA CALIFORNIA
3 municipios | 1755 | 109 | 1864 | 357 | 12 | |
| | 85 | 1 | 86 | 42 | 0 | |
| SONORA
9 municipios | | | | | | |
| Total Since July 1, 1956 | 1840 | 110 | 1950 | 399 | 12 | |
| From Beginning of Program* | 2346 | 119 | 2465 | 631 | 48 | |

* Beginning of Program in Republic of Mexico was Jan. 1956

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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

Region - Mexico

KHAPRA BEETLE ERADICATION

Fiscal Year 1957

CURRENT AND CUMULATIVE TREATMENT SUMMARY

| State | Total Infested Sites | Total Volume in Cubic Feet | Sites Treated & Released | | Volume Treated & Released | | Methyl Bromide Used* | |
|-----------|----------------------|----------------------------|--------------------------|--------------|---------------------------|--------------|----------------------|--------------|
| | | | This Period | Since Jan. 1 | This Period | Since Jan. 1 | This Period | Since Jan. 1 |
| | | | July 1 1956 | Jan. 1956 | July 1 1956 | Jan. 1956 | July 1 1956 | Jan. 1956 |
| R. Mexico | 48 | 11,687,677 | 43 | - | 10,406,509 | 10,459,309 | 80,526 | 80,826 |

CATEGORY 2

| State | No. Properties Treated | | Cubic Feet Treated | | Methyl Bromide Used* | |
|-----------|------------------------|--------------|--------------------|--------------|----------------------|--------------|
| | This Period | Since Jan. 1 | This Period | Since Jan. 1 | This Period | Since Jan. 1 |
| | July 1 1956 | Jan. 1956 | July 1 1956 | Jan. 1956 | July 1 1956 | Jan. 1956 |
| R. Mexico | 1 | 1 | 866,000 | 866,000 | | |

RETREATMENTS AND EXTENSIONS

| State | No. Properties Treated | | Cubic Feet Treated | | Methyl Bromide Used* | |
|-----------|------------------------|--------------|--------------------|--------------|----------------------|--------------|
| | This Period | Since Jan. 1 | This Period | Since Jan. 1 | This Period | Since Jan. 1 |
| | July 1 1956 | Jan. 1956 | July 1 1956 | Jan. 1956 | July 1 1956 | Jan. 1956 |
| R. Mexico | 1 | 1 | 2,000 | 2,000 | 20 | 20 |

* Pounds ** One of the infested sites was treated in May 1956

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

Region - Mexico

KHAPRA BEETLE

Fiscal Year 1957

COOPERATIVE AID RECEIVED

| 12345678 | | | | | | | | | | |
|---|--------------------------|-------------------|----------------------|-------|-----------|------------------------|-------------------------------|--------------------|---------|--|
| Source of Aid | Cash and Equivalent Aid* | | | | | Total of Cash & Equiv. | Intangible Service Estimate** | Source Grand Total | Remarks | |
| | Cash | Personal Services | Equipment & Supplies | Space | | | | | | |
| Defensa Agricola | | 6,000 | 34,968.64 | 600 | 41,568.64 | | | | | |
| Comite Coop. para la
Campana Contra el
Khapra | | | 20,628.03 | | 20,628.03 | | | | | |
| Total | | 6,000 | 55,596.67 | 600 | 62,196.67 | | | | | |

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.

The following table shows the results of the experiments conducted on the 10th of May 1881, at the Agricultural Station, Cambridge, Mass. The experiments were conducted by Mr. J. H. Comstock, and the results were published in the "Report of the Massachusetts Agricultural Experiment Station for the year 1881."

| Experiment | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 3 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 4 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 5 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 6 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 7 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 8 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 9 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 10 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

The following table shows the results of the experiments conducted on the 10th of May 1881, at the Agricultural Station, Cambridge, Mass. The experiments were conducted by Mr. J. H. Comstock, and the results were published in the "Report of the Massachusetts Agricultural Experiment Station for the year 1881."

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

Region - Mexico

KHAPRA BEETLE

Fiscal Year 1957

EXPENDITURES BY SOURCE AND BY ACTIVITY

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------------------------------|-------------------------|-------------------------|--------|------------|------------|------------------------|-------|------------|
| Source of Cash
& Equivalent | Planning &
Direction | Technical
Assistance | Survey | Control | Regulatory | Methods
Improvement | Other | Total |
| Plant Pest Control
Division | 8,500 | 4,200 | 25,600 | 105,753 | 2,200 | | | 146,253*** |
| Other Organizations
(Name) | | | | | | | | |
| Defensa Agricola | 1,200 | 1,300 | | 37,968.64 | 1,100 | | | 41,568.64 |
| Comite Coop. para la | | | | | | | | |
| Campaña Contra Khapra | | | | 20,628.03 | | | | 20,628.03 |
| Subtotal - Other | 1,200 | 1,300 | | 58,596.67 | 1,100 | | | 62,196.67 |
| Organizations | | | | | | | | |
| Total (of PPC | 9,700 | 5,500 | 25,600 | 164,349.67 | 3,300 | | | 208,449.67 |
| & Other) | | | | | | | | |
| Contributed | | | | | | | | |
| Services ** | | | | | | | | |
| Grand Total | 9,700 | 5,500 | 25,600 | 164,349.67 | 3,300 | | | 208,449.67 |

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.

*** In this total the amount of \$88,702 spent by the Western Region from July 1 to December 31, 1956.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

SOUTHERN REGION

ANNUAL PROGRAM REPORT

KHAPRA BEETLE

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Regulatory, Control, Research, and Extension Agencies
of the Affected States

December 6, 1957
Gulfport, Mississippi

C. C. Fancher
Regional Supervisor

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1964

1965

1966

1967

1968

1969

1970

1971

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|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| 10.1.1 | 10.1.1.1 | 10.1.1.2 | 10.1.1.3 | 10.1.1.4 | 10.1.1.5 | 10.1.1.6 | 10.1.1.7 | 10.1.1.8 | 10.1.1.9 | 10.1.1.10 | 10.1.1.11 | 10.1.1.12 | 10.1.1.13 | 10.1.1.14 | 10.1.1.15 | 10.1.1.16 | 10.1.1.17 | 10.1.1.18 | 10.1.1.19 | 10.1.1.20 | 10.1.1.21 | 10.1.1.22 | 10.1.1.23 | 10.1.1.24 | 10.1.1.25 | 10.1.1.26 | 10.1.1.27 | 10.1.1.28 | 10.1.1.29 | 10.1.1.30 | 10.1.1.31 | 10.1.1.32 | 10.1.1.33 | 10.1.1.34 | 10.1.1.35 | 10.1.1.36 | 10.1.1.37 | 10.1.1.38 | 10.1.1.39 | 10.1.1.40 | 10.1.1.41 | 10.1.1.42 | 10.1.1.43 | 10.1.1.44 | 10.1.1.45 | 10.1.1.46 | 10.1.1.47 | 10.1.1.48 | 10.1.1.49 | 10.1.1.50 | 10.1.1.51 | 10.1.1.52 | 10.1.1.53 | 10.1.1.54 | 10.1.1.55 | 10.1.1.56 | 10.1.1.57 | 10.1.1.58 | 10.1.1.59 | 10.1.1.60 | 10.1.1.61 | 10.1.1.62 | 10.1.1.63 | 10.1.1.64 | 10.1.1.65 | 10.1.1.66 | 10.1.1.67 | 10.1.1.68 | 10.1.1.69 | 10.1.1.70 | 10.1.1.71 | 10.1.1.72 | 10.1.1.73 | 10.1.1.74 | 10.1.1.75 | 10.1.1.76 | 10.1.1.77 | 10.1.1.78 | 10.1.1.79 | 10.1.1.80 | 10.1.1.81 | 10.1.1.82 | 10.1.1.83 | 10.1.1.84 | 10.1.1.85 | 10.1.1.86 | 10.1.1.87 | 10.1.1.88 | 10.1.1.89 | 10.1.1.90 | 10.1.1.91 | 10.1.1.92 | 10.1.1.93 | 10.1.1.94 | 10.1.1.95 | 10.1.1.96 | 10.1.1.97 | 10.1.1.98 | 10.1.1.99 | 10.1.1.100 |
|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|

10.2

I. INTRODUCTORY

A. Statement of Problem

As of June 30, 1957, the khapra beetle, (Trogoderma granarium Everest), had not been found in any of the 11 southern states which comprise the Southern Region, Plant Pest Control Division, Agricultural Research Service, U. S. Department of Agriculture. Surveys will be continued during the fiscal year 1958. All suspicious specimens collected will continue to be submitted to Washington for determination.

B. Program Justification Statement

Survey plans, as contained in the justification statement submitted for this fiscal year, were essentially carried out without change.

C. Program Objective

The long-term objective of the khapra beetle program in the Southern Region was to eventually inspect all establishments likely to harbor an infestation of this beetle. Under the immediate goal, establishments most likely to become infested were scheduled to be inspected first. Appropriate state agencies cooperated with the Division in the execution of this survey work.

D. Changes from Work Plan

The entire effort to date has been one of survey. The plan outlined under the 1957 justification statement was carried out without change.

E. Status of Infestation

At the close of the current fiscal year, as previously stated, the khapra beetle was not known to exist in any state within the Southern Region.

II. PROGRAM HISTORICAL INFORMATION

The khapra beetle is native to India and Ceylon. In these countries it is considered a very destructive stored grain insect. Beetles discovered in a warehouse at Alpaugh, Tulare County, California, in November 1953, were the first known to exist in the Western Hemisphere.

III. PROGRAM ACTIVITY DURING FISCAL YEAR

A. Planning and Direction

Activities during the reporting period were limited to surveys of establishments handling products likely to become infested with khapra beetles. Many of these firms had received grain products from companies located in the infested areas of Arizona, California, and New Mexico. Information concerning the movement of grain and grain produce from these states was supplied to the Southern Region by interested cooperating state and federal officials.

B. Technical Assistance

Qualified Plant Pest Control employees provided technical assistance to other state and federal employees not familiar with the problems, and to private entomologists, seed and grain dealers, etc., through the holding of training schools or training sessions at strategic locations within the various states. At these training sessions or work schools, information was released relative to the insect itself, detection procedures, survey procedures, record keeping, etc.

C. Survey

As stated elsewhere in this brief report, limited surveys were made throughout the suspected areas of the Southern Region to determine the presence or absence of this stored grain pest. Table I of this report summarizes by states the total surveys made and specimens collected for identification.

D. Other

Plant Pest Control officials in the Southern Region received satisfactory cooperation in this survey work from interested state agencies, seed and grain dealers, elevator operators, and others dealing in stored grains.

CHAPTER I

The first chapter of the history of the United States is devoted to the early years of the nation. It begins with the discovery of the continent by Christopher Columbus in 1492, and continues through the years of exploration and settlement. The chapter describes the early struggles of the colonists against the elements and the native Americans, and the gradual development of the colonies into a nation.

CHAPTER II

The second chapter of the history of the United States is devoted to the years of the American Revolution. It begins with the first battles of the war, and continues through the years of fighting and the final victory at Yorktown in 1781. The chapter describes the struggles of the colonists against the British, and the eventual establishment of the United States as an independent nation.

CHAPTER III

The third chapter of the history of the United States is devoted to the years of the early republic. It begins with the first years of the new nation, and continues through the years of the early republic, including the presidencies of George Washington and John Adams. The chapter describes the struggles of the new nation to establish itself as a powerful and independent country.

CHAPTER IV

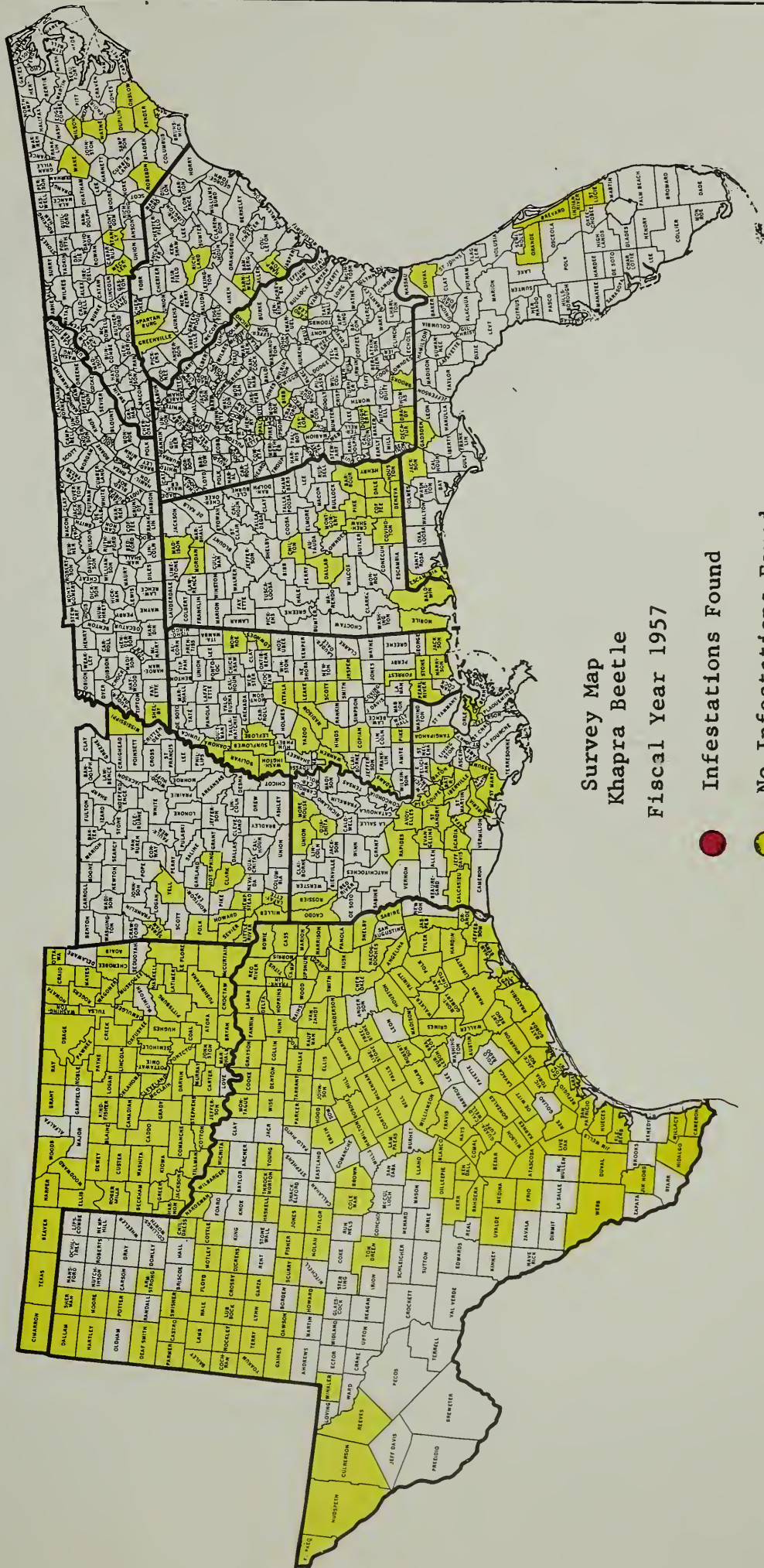
The fourth chapter of the history of the United States is devoted to the years of the early republic. It begins with the first years of the new nation, and continues through the years of the early republic, including the presidencies of George Washington and John Adams. The chapter describes the struggles of the new nation to establish itself as a powerful and independent country.

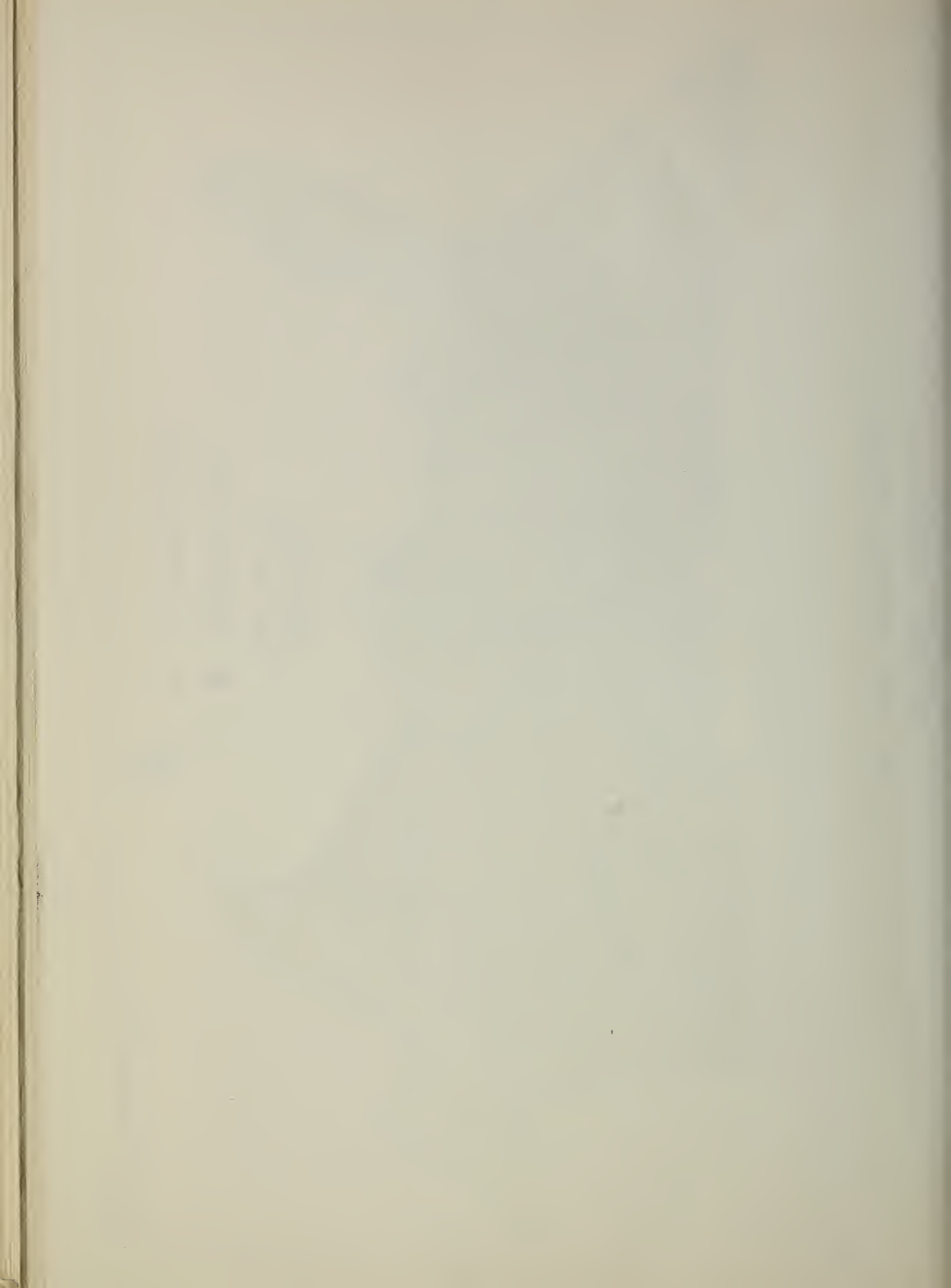
TABLE I. KHAPRA BEETLE SURVEYS

FISCAL YEAR 1957

| State | Inspections | | | Specimen
Collections
Submitted
for Ident. | Sites
Infested |
|------------------------------|-------------|--------|-------|--|-------------------|
| | Initial | Repeat | Total | | |
| Alabama | 82 | 5 | 87 | 21 | 0 |
| Arkansas | 29 | 0 | 29 | 0 | 0 |
| Florida | 34 | 0 | 34 | 6 | 0 |
| Georgia | 19 | 0 | 19 | 1 | 0 |
| Louisiana | 111 | 0 | 111 | 1 | 0 |
| Mississippi | 61 | 3 | 64 | 0 | 0 |
| North Carolina | 15 | 0 | 15 | 18 | 0 |
| Oklahoma | 312 | 18 | 330 | 83 | 0 |
| South Carolina | 7 | 0 | 7 | 6 | 0 |
| Tennessee | 19 | 3 | 22 | 0 | 0 |
| Texas | 796 | 373 | 1,169 | 100 | 0 |
| Totals | 1,485 | 402 | 1,887 | 236 | 0 |
| From Beginning
of Program | 1,711 | 408 | 2,119 | 236 | 0 |

SOUTHERN REGION PLANT PEST CONTROL DIVISION





KHAPRA BEETLE PROGRAM

• • •

PROGRAM ANNUAL REPORT

• • •

**UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION**



* *

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION

ANNUAL PROGRAM REPORT

KHAPRA BEETLE

July 1, 1956 - June 30, 1957

Cooperating Agencies:

Arizona State Department of Agriculture
California State Department of Agriculture
New Mexico State Department of Agriculture
California County Departments of Agriculture

October 30, 1957
Oakland, California

Jim R. Dutton
Regional Supervisor

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| Program Objective | 1 |
| Status of Infestation | 2 |

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|--------------------------------|---|
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|--------------------------------|---|

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|---------------------------------|---|
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INTRODUCTORY

Statement of Problem

The khapra beetle (Trogoderma granarium) is considered the most destructive of all stored grain pests. It is not a pest of growing grain. It is native to India and Ceylon. A collection of this pest at Alpaugh, California, in 1953 was the first record of its becoming established in the Western Hemisphere.

Soon after the Alpaugh infestation was found, the grain producing states were inspected. Specimens were found in Arizona, California and New Mexico, and in Baja California, Republic of Mexico.

Prior to July 1, 1956, infestations of khapra beetle had been found on 107 properties in Arizona, 273 in California and five in New Mexico. During the period July 1, 1956, to June 30, 1957, inspection revealed 48 additional properties infested in Arizona, 23 in California and one in New Mexico.

Program Justification Statement

The goals of the Khapra Beetle Program are:

- To locate all infestations of this insect that may exist in this country;
- To prevent the further spread of this pest;
- To effect the eradication of the khapra beetle in the United States;
- To cooperate with the Republic of Mexico in the accomplishment of the above objectives in that country.

Program Objective

The long range objective of the program is complete eradication of the khapra beetle from the Western Hemisphere. In this effort 431 properties have been fumigated and the khapra beetle apparently eradicated therefrom. Only 26 known infested properties remain. Surveys will continue in an effort to locate all existing infestations.

During the year 174 infested properties were successfully fumigated for khapra beetle and released from quarantine.

Status of Infestation

In Arizona 155 properties have been found infested, California had 296, and New Mexico had six. Eradication measures have been applied to 145 properties in Arizona, 281 in California and five in New Mexico, leaving 26 known infestations in the three states, which still require treatment.

PROGRAM HISTORICAL INFORMATION

The khapra beetle is a relatively new pest to grain storages and mills in the United States, having been reported in November 1953 from Alpaugh, California. The seriousness of the khapra beetle was immediately apparent. Steps were taken to survey representative grain handling establishments in the various states, which resulted in finding 25 infestations, eleven each in Arizona and California, and three in New Mexico.

Delimiting surveys conducted during 1954 resulted in finding 13 additional infestations in Arizona and 39 in California. A Federal Domestic Quarantine which became effective February 21, 1955, was instituted to assist in preventing further spread of the beetle.

Since November 1953, thousands of inspections have been made throughout this country and northern Mexico. So far, infestations have not been found outside the three states and the States of Baja California and Sonora in the Republic of Mexico.

Eradication of the pest was the ultimate aim and this objective seemed possible. Control resulting in partial suppression only, seemed to be unwise. Contact insecticides would not penetrate the cracks, nail holes, and crevices in which the larvae seemed to congregate. Fumigation of an entire building, enclosed in gas-tight cover, was the best method of control and eradication proposed. This has proved feasible and effective.

PROGRAM ACTIVITY DURING FISCAL YEAR

Planning and Direction

Procedure

Eradication of the pest from known infested properties had progressed to the extent that eradication of the pest

seemed to be in sight. The State Entomologists of the affected states concurred in continuing the program on an eradication basis. More pest control companies were encouraged to engage in tarping structures for fumigation. It was expected that, with competition and experience, favorable contract prices would result.

Division, State, and County personnel worked very closely in the fumigation work. Personnel from other division programs operating in the area were given training in khapra beetle control techniques and their services during on-the-job training enhanced accomplishment.

Contracts were sometimes let on a group of properties in order to afford the contractor sufficient work to encourage low bids, and to facilitate work of the contractor and the program personnel. This grouping of properties for contracting purposes also resulted in economical buying of fumigants and other control material use.

Recommendations For Coming Year

Upon the reorganization of the Plant Pest Control Division, the conduct of the Khapra Beetle Program became a direct responsibility of the area supervisors, with technical assistance and over-all activity coordinated by the Regional Office. By careful planning the program continued without interruption.

Financing the eradication efforts has continued as a Federal-State cooperative arrangement, without direct cost to the property owner.

It is planned that trained personnel will continue to be utilized in survey, regulatory and control activities and that additional needed personnel will be trained in all phases of the work.

Technical Assistance

Assistance of the entomologists of Agricultural Marketing Service stationed in Fresno, California, and Mesa, Arizona, was continued. These men conducted research on fumigation

techniques, developed new fumigation schedules for bulk feed, continued efforts for developing dosages that would be less damaging to seed germination, and worked with cross breeding of khapra beetle with other grain infesting trogoderma to determine whether these species would cross in nature and their progeny damage grain.

State entomologists gave excellent assistance to the program in furnishing help in all phases of the work, and in California the economic entomologist helped in developing schedules for bulk feed fumigation, a very valuable development in treating the infested feed mills and other large grain storage facilities.

Extension entomologists and County Agricultural Commissioners provided office space for a few of the district offices. These cooperators gave strong support to the program, many of them participating personally in the co-operative work.

Program personnel worked very closely with county agents, farmers, and industries, advising them of infestation occurrences, treatments, and recommendations for better grain sanitation.

Program personnel facilitated efforts of research workers in many instances. They assisted in developing methods of testing and replasticizing tarps which had become worn with use, made recommendations concerning gas analysis machines, and provided instruction to employees of the Republic of Mexico in fumigation techniques.

Survey

Objective

The objective of survey was twofold: To find and delimit the pest, and to evaluate effectiveness of control.

Procedures or Techniques Used

Survey for khapra beetle involves strenuous, painstaking physical effort, necessitating searching the premises with flashlight and tweezers, probing every crevice where beetles might secrete themselves. This

method could not always be of optimum use in large storage tanks partially filled with grain. To cope with these situations a method of inspecting such tanks was developed. It had been observed that this pest has an affinity for cloth or other subjects resting on the surface of grain masses. Sacks were folded, forming an accordion pleat, a stout string tied around the middle, and the folded sack dropped into the tank to rest on the surface of the grain. It was secured by tying the end of the string to some part of the tank, usually the door hinge. The sack which attracted larvae was lifted from the tank and examined for specimens at the site.

Accomplishments

During the year examinations for khapra beetle were conducted on 20,546 sites. This included 8,440 initial inspections and 12,106 repeat inspections. Specimens submitted for determination totaled 7,018 while 72 sites were found infested.

Recommendations For Coming Year

Survey for khapra beetle cannot be relinquished and should not be curtailed. The infested sites fumigated can become reinfested by reintroduction of the pest associated with infested grain, sacks, or other materials. All properties should be inspected, in an effort to minimize the chances for infestations to occur and spread. Money spent for detection surveys is highly productive and essential to an eradication program.

The sack "trap" has been developed; however, lures which are attractive to the khapra beetle and not harmful to the grain, feed, or cereal should be developed.

There should be a continuation of inspection of grain storage sites throughout the entire United States with emphasis on those located in the restricted areas of the country known to have been infested.

Eradication or Control

Objective

The objective of the khapra beetle program is prevention and spread of eradication.

Procedures or Techniques Used

If eradication is to be realized, fumigation is the only sure method known. Buildings are enclosed in gas-tight tarpaulins, in order that the outside as well as inside of the structure can be fumigated. Methyl bromide gas is injected into the tarped building usually at the rate of 5 pounds per 1000 cubic feet. A concentration of a minimum of 2 pounds per 1000 cubic feet must be maintained for 24 hours during a period of 48 hours during which the fumigation is in progress. In order to maintain this concentration, readings of the amount of gas are made at intervals of 2, 4, 6, 8, 12, 18, 24, 36, and 48 hours. If the concentration drops, gas is added to bring it up to minimums required.

Wind is a problem in fumigation operations. Ropes are used to help hold tarps to structures. If billowing occurs, evacuation fans are turned on to hold tarps tight to the building by creating a slight vacuum. If evacuation occurs during the time gas is in the structure, additional replacement gas is added after the fan is turned off.

Our technique seems to be adequate to fumigate structures in accomplishing khapra beetle eradication. Perhaps results could be enhanced by development of a more effective, longer lasting environs treatment material.

Accomplishments

During the year, 174 structures were fumigated.

Changes recommended

No major changes are contemplated.

Regulatory Activities

Objective.

Federal Quarantine No. 76 was promulgated to enforce measures designed to prevent the spread of khapra beetle from infested sites. Parallel state quarantines prevent the movement of regulated articles intrastate.

Procedures or Techniques Used

Since Quarantine No. 76 regulates only premises where khapra beetle have been recovered, regulatory problems as such do not present a great problem. In moving regulated articles from infested sites the articles must be fumigated under approved methods stipulated in administrative instructions. Such articles are listed and the approved treatment methods are clearly stated. Most articles can be fumigated under gas-tight tarpaulins when stacked on pallets and when the pile of commodity to be fumigated does not exceed practical prescribed dimensions. Some articles, such as empty burlap bags, are usually treated in approved fumigation chambers.

Due to the increased cost of assembling articles for commodity fumigation, most shippers desire to have the infested premise fumigated in its entirety to meet regulations compliance.

Recommendations for Coming Year

No change in regulatory procedures is contemplated.

Methods Improvement

Objective

We are making every effort to reduce the amount of gas used in eradication fumigation. In some instances the testing of tarpaulins before placing on buildings resulted in detecting leaks. By having

these tarpaulins repaired for future use, we saved gas. A simple method of testing tarps was developed whereby program personnel were able to test tarpaulins routinely and with a minimum of equipment.

Work Performed

Tarpaulin testing was designed to improve control procedures.

The use of traps was instituted to allow more thorough inspection of grain storages otherwise inaccessible to personnel.

Accomplishments

The installation of traps in grain storages, although time-consuming on the initial installation, expedites inspection after the traps are once installed. These are placed where inspection cannot be conducted as well by any other means.

Worn tarpaulins have been replasticized by fumigators at the insistence of Division personnel, when testing showed that they were in poor condition and not gas-tight.

Suggestions for Coming Year

Control should be "reworked" with an aim toward tighter provisions and clearer designation of responsibility for damages should they occur. Clearer enforcement language should be incorporated.

Adequate examination of personnel associated with fumigation operations should be required as a means of preventing physical harm.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

SUMMARY OF ASSOCIATED ACTIVITIES

Region Western

KHAPRA BEETLE

Fiscal Year 1957

| Area | Public Meetings Attended | P r e s e n t a t i o n s | | | | | Feature & News Stories* | Extent These Aids Were Used** | | | Special Reports | |
|------------|--------------------------|---------------------------|--------|-------|-------|----|-------------------------|-------------------------------|------|-------|-----------------|------------------------|
| | | Talks | Slides | Films | Radio | TV | | Exhibits | Bul* | Cir.* | | Infest. Maps & Posters |
| Arizona | 4 | 6 | | | | | | | 1900 | | | 3 |
| Washington | | 2 | 1 | 1 | | | | | | | | 3 |
| Oregon | | | | | | | | | | | | |
| Utah | 5 | 3 | 2 | 2 | 1 | | 2 | 3 | 4 | 2 | | 2 |
| Total | 9 | 11 | 3 | 3 | 1 | | 2 | 713 | 1904 | 2 | | 8 |

* Written by Federal personnel for release direct or through cooperators.

** This should be a conservative estimate (accurate record for these items impractical).

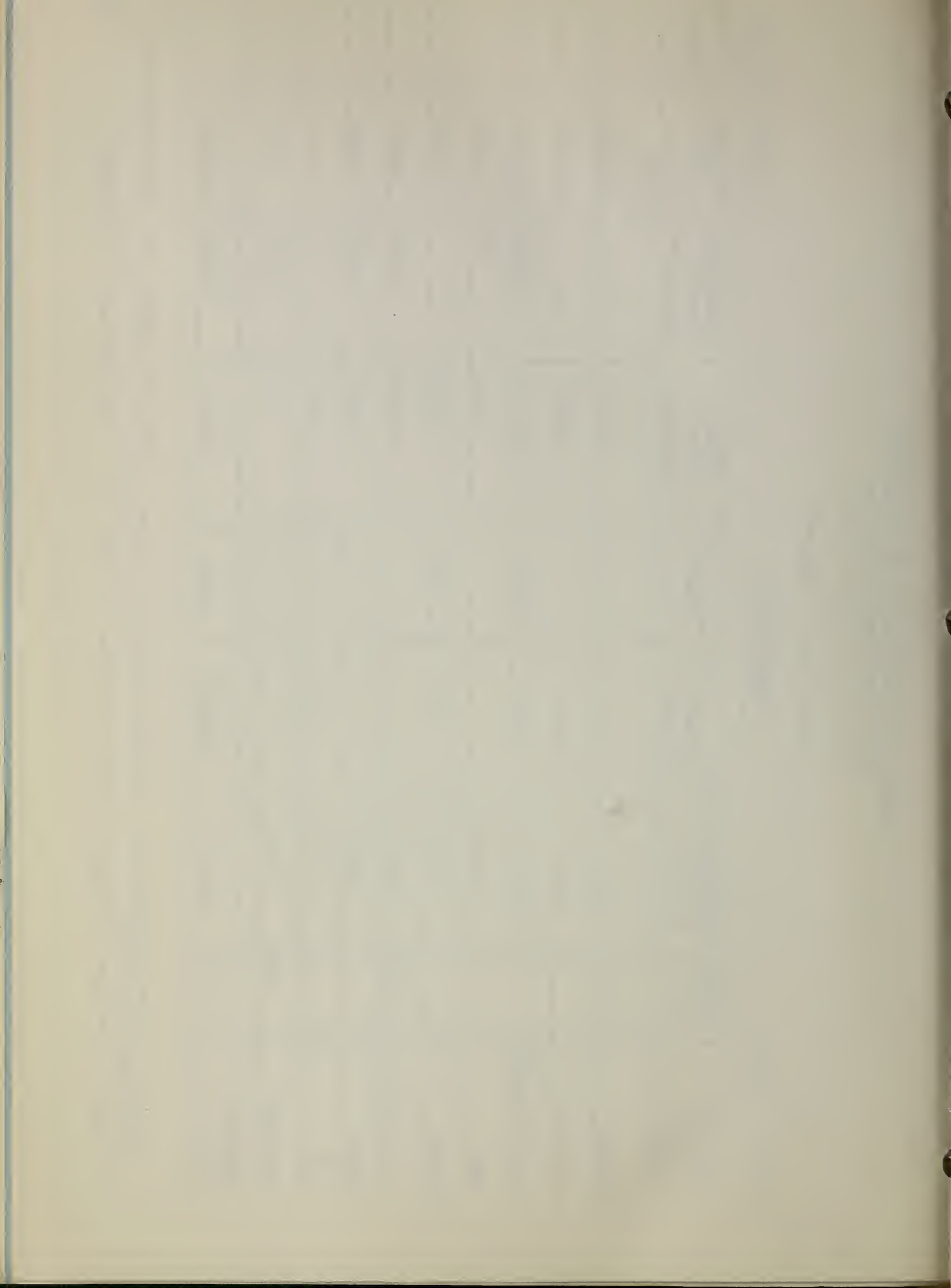
UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

COOPERATIVE AID RECEIVED

| Region | Western | KHAPRA BEETLE | | | | | | Fiscal Year 1957 | |
|-------------------------|--------------------------|-------------------|---|----------------------|-------|----------------------------|-------------------------------|--------------------|---------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| State and Source of Aid | Cash and Equivalent Aid* | | | Equipment & Supplies | Space | Total of Cash & Equivalent | Intangible Service Estimate** | Source Grand Total | Remarks |
| | Cash | Personal Services | | | | | | | |
| Arizona | | 50,381 | | 58,415 | | 108,796 | 10,585 | 119,381 | |
| California | | 64,100 | | 115,100 | | 179,200 | | 179,200 | |
| Calif. Counties | | 157,650 | | 4,950 | 2,400 | 165,000 | 35,000 | 200,000 | |
| Idaho | | 1,100 | | | | 1,100 | 580 | 1,680 | |
| Nevada | | 1,200 | | 300 | 200 | 1,700 | | 1,700 | |
| New Mexico | 4,000 | 11,000 | | | | 15,000 | 1,000 | 16,000 | |
| Oregon | | 1,000 | | | | 1,000 | 1,450 | 2,450 | |
| Utah | | 846 | | 163 | | 1,009 | 135 | 1,144 | |
| Washington | 400 | 550 | | | | 950 | 1,750 | 2,700 | |
| Total This Period | 4,400 | 287,827 | | 178,928 | 2,600 | 473,755 | 50,500 | 524,255 | |

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

** Limited to services incidental to other activities for which only an estimated value is available.



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division
EXPENDITURES BY SOURCE AND BY ACTIVITY
KHAPRA BEETLE

Region Western

Fiscal Year 1957

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|------------------------------|------------|-----------|---------|---------|------------|---------------------|--------|-----------|
| Source of Cash & Equivalent* | Planning & | Technical | Survey | Control | Regulatory | Methods Improvement | Other | Total |
| Plant Pest Control Division | 75,888 | 55,191 | 179,373 | 310,453 | 27,596 | 41,394 | | 689,895 |
| Other Organizations (Name) | | | | | | | | |
| States | 25,300 | 16,700 | 50,852 | 202,693 | 8,960 | 4,150 | 100 | 308,755 |
| Counties | 18,150 | 57,050 | 49,450 | 4,950 | 33,000 | | 2,400 | 165,000 |
| Subtotal-Other Organizations | 43,450 | 73,750 | 100,302 | 207,643 | 41,960 | 4,150 | 2,500 | 473,755 |
| Total of (PPC & Other) | 119,338 | 128,941 | 279,675 | 518,096 | 69,556 | 45,544 | 2,500 | 1,163,650 |
| Contributed Services** | | | | | | | | |
| States | 4,230 | 5,125 | 3,625 | | 1,500 | | 1,020 | 15,500 |
| Counties | | | | | | | 35,000 | 35,000 |
| Total | 4,230 | 5,125 | 3,625 | | 1,500 | | 36,020 | 50,500 |
| Grand Total | 123,568 | 134,066 | 283,300 | 518,096 | 71,056 | 45,544 | 38,520 | 1,214,150 |

* Limited to direct appropriation, allotments from other sources, services and supplies for which there is an actual cash expenditure.

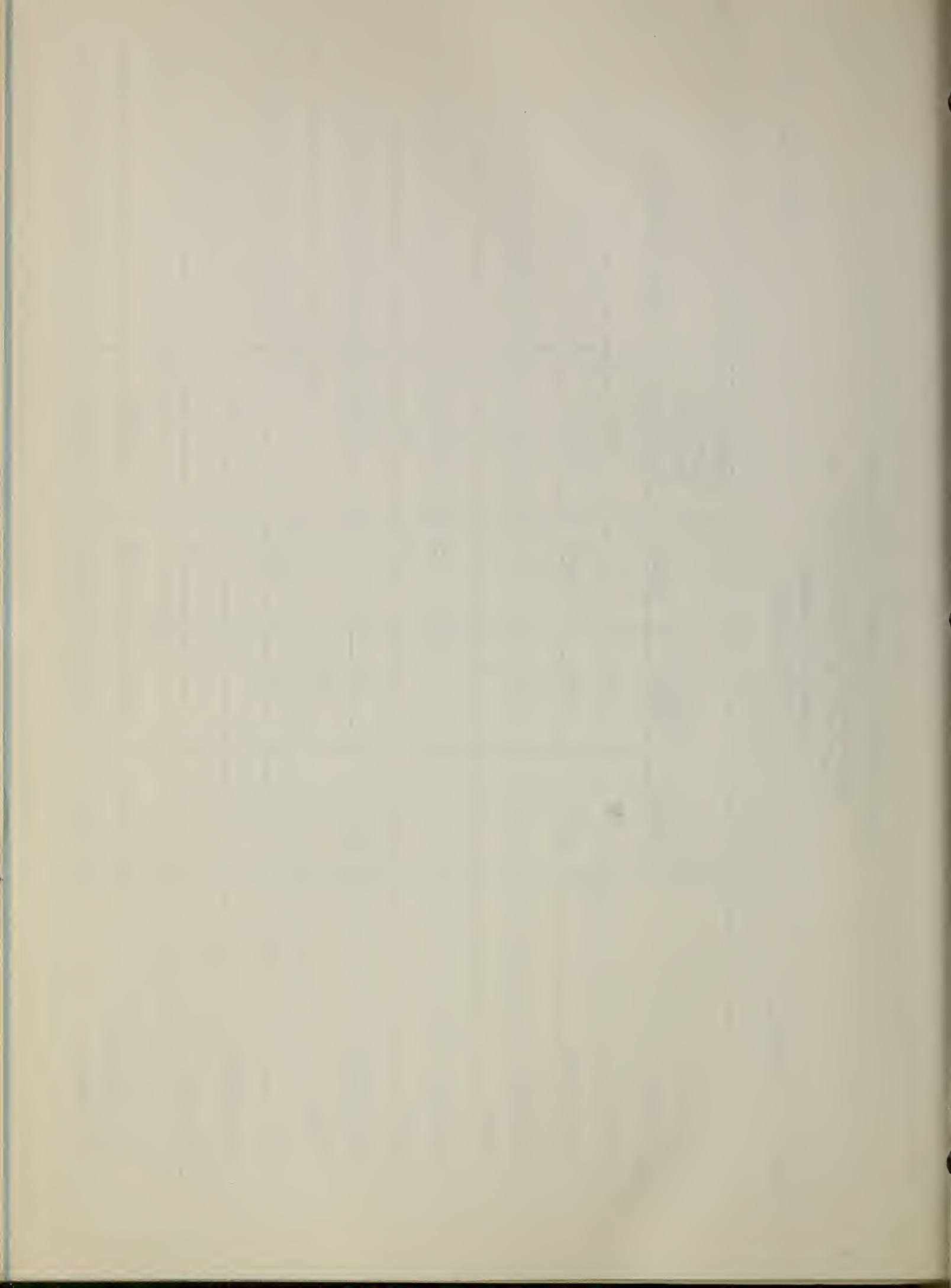
** Limited to services incidental to other activities for which only an estimated value is available.

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division
INSPECTION SUMMARY
KHAPRA BEETLE

Fiscal Year 1957

Region Western

| State | Inspections | | Specimen
Collections
Submitted
for Ident. | Sites Infested |
|------------------------------|-------------|--------|--|----------------|
| | Initial | Repeat | Total | |
| Arizona | 3,512 | 1,225 | 4,737 | 48 |
| California | 3,387 | 9,922 | 13,309 | 23 |
| Colorado | 63 | 122 | 185 | |
| Idaho | 15 | 2 | 17 | |
| Montana | 0 | 0 | 0 | |
| Nevada | 0 | 9 | 9 | |
| New Mexico | 1,438 | 725 | 2,163 | 1 |
| Oregon | 50 | 106 | 156 | |
| Utah | 19 | 124 | 143 | |
| Washington | 49 | 0 | 49 | 12 |
| Wyoming | 0 | 0 | 0 | 0 |
| Total This Period | 8,533 | 12,235 | 20,768 | 72 |
| From Beginning
of Program | 44,333 | 24,809 | 69,142 | 457 |



Fiscal Year 1957

Region Western

Fiscal Year 1957

Fiscal Year 1957

Fiscal Year 1957

Fiscal Year 1957

Fiscal Year 1957

Fiscal Year 1957

13

13

